A REVISION OF PLECTRANTHUS (LABIATAE) IN AUSTRALASIA

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SUMMARY

Plectranthus L'Herit., *Rabdosia* (Bl.) Hassk. (*Isodon* (Benth.) Kudo, *Amethystanthus* Nakai, *Homalocheilos* J. K. Morton), *Ceratanthus* F. Muell. ex G. Taylor, *Coleus* Lour. and probably *Solenostemon* Thonning should be treated as distinct genera.

Plectranthus is represented by many species in Africa and a few on the Asiatic mainland. Fourteen species are found in Australia, chiefly in Queensland, of which *P. alloplectus*, *P. amicorum*, *P. apreptus*, *P. argentatus*, *P. diversus*, *P. gratus*, *P. intraterraneus*, *P. mirus*, *P. spectabilis* and *P. suaveolens* are described as new. *P. congestus* R. Br. extends to New Guinea and Timor and *P. parviflorus* Willd. (*P. parviflorus* Spreng. in Henckel, non R. Br. nec Guerke, *P. paniculatus* Jacq., *P. australis* R. Br., *P. sieberi* Benth.) extends to Hawaii, but the record of its occurrence in New Guinea was based on a specimen of *Ocimum* sp. *P. graveolens* R. Br., *P. foetidus* Benth. and *P. forsteri* Benth. are distinguished from *P. parviflorus*, *P. forsteri* being found only in the New Hebrides, New Caledonia, Fiji and Samoa but is in cultivation under the name of *P. coleoides*. *P. madagascariensis* (Pers.) Benth. from Mauritius and *P. zeylanicus* Benth. also differ from *P. parviflorus* and from one another. *P. zeylanicus* is cultivated in Ceylon but native to South Africa where it is known by the later name *P. tomentosus* Benth. *P. klossii* S. Moore is restricted to Timor and New Guinea and *P. petraeus* Backer ex Adelbert to Java.

All the Australian species were grown and twelve of them examined in the field. Useful diagnostic characters were found in the habit, number of teeth on the leaf, absence or distribution on stem and leaf of gland-tipped hairs and sessile glands, retrorse or antrorse direction of non-glandular hairs on stem and lower surface of leaf, degree of bend in the corolla-tube and shape of lobes of the fruiting calyx, especially the upper lip. Only the last-mentioned had been used by earlier workers; the others were first recognized and their value assessed from living plants which shrink much during the preparation of dried specimens often with considerable distortion of leaf shape. Few wild hybrid plants were found but five species were involved in spontaneous hybrids in the garden.

P. parviflorus Willd. and *P. parviflorus* Spreng. in Henckel are two different names published in the same year based on plants cultivated in Germany, the former of unknown origin, the latter said to have originated from Peru. Both refer to the same Australian species which is not *P. parviflorus* R. Br. The acceptance of Willdenow's name as correct followed from the determination of the dates of publication of his Hortus Berolensis, Henckel's Adumbrationes . . . and Jacquin's Fragmenta Botanica. The species varies much in the density of indumentum and in habit, both of which are influenced by the environment.

INTRODUCTION AND ACKNOWLEDGEMENTS

Since Bentham's account of the Labiatae in Fl. Aust. 5 : 70–137 (1870), the name *Plectranthus parviflorus* Willd. has been applied to plants in Australia that appeared to exhibit considerable variability between themselves in habit, indumentum, flower colour and leaf form, as well as to plants from Timor, New Caledonia and

Hawaii. My attention had been attracted to this apparent variability many years ago, but about 1953 a series of circumstances led me to undertake a study of the group. Plants from different localities were already growing under various conditions in my garden when three conspicuously different populations were found on a spur of the McPherson Range and many characters of living plants studied. Differences in indumentum and corolla obvious on living plants were then found on dried specimens and so the revision began. As the work progressed it became necessary to study plants from Malesia and the Pacific Islands. The species of this area from Australia to Timor and Hawaii form a fairly homogenous group geographically isolated from the other species of the genus.

My collection of living plants increased and representatives of many of these and others have been grown in the Brisbane Botanic Gardens under conditions different from any of these in my garden. Most plants were propagated from cuttings so that the effect of minor variations in habitat could be observed.

Beside the collections in the Queensland Herbarium, Brisbane (BRI), I have studied those in the North Queensland Herbarium, Cairns (CAIRNS), National Herbarium of New South Wales, Sydney (NSW), Herbarium Australiense, Canberra (CANB), National Herbarium of Victoria, Melbourne (MEL), State Herbarium of South Australia, Adelaide (AD), Western Australian Herbarium, Perth (PERTH), Department of Forests, Lae (LAE), British Museum (Natural History), London (BM), Herbarium, Royal Botanic Garden, Edinburgh (E), Herbarium, Royal Botanic Gardens, Kew (K), Botanische Anstalten der Martin-Luther Universität, Halle (HAL), Rijksherbarium, Leiden (L), Muséum National d'Histoire Naturelle, Paris (P), Botanical Department of the National Museum, Prague (PR), Naturhistorisches Museum, Vienna (W), Botanisches Museum der Universität, Zürich (Z), and types in the Botanischer Garten und Museum, Berlin–Dahlem (B) and the University of Cambridge, England (CGE).

For the opportunity to study this material I am indebted to the late Dr. H. Flecker (Cairns), Mr. R. H. Anderson* (Sydney), Mr. A. W. Jessep and Mr. R. T. M. Pescott (Melbourne), Dr. Hj. Eichler (Adelaide), Dr. N. T. Burbidge (Canberra), Dr. R. D. Hoogland (Canberra), Mr. R. D. Royce (Perth), Mr. J. S. Womersley Lae), Dr. S. M. Walters (Cambridge), Dr. R. H. Rechinger (Vienna), Dr. A. Pilat (Prague), Dr. K. Werner (Halle), Sir George Taylor (British Museum and Kew), Dr. J. E. Dandy and Mr. R. Ross (British Museum) and Dr. G. Buchheim (Berlin–Dahlem). Sir George Taylor, Dr. Dandy and Dr. Buchheim also very kindly supplied copies of descriptions and illustrations from works not available in Australia, and Dr. W. T. Stearn (British Museum) kindly investigated the date of publication of Jacquin's Fragmenta Botanica and provided notes on types and other specimens. Living plants have been collected or transmitted by my colleagues Messrs S. L. Everist, L. S. Smith*, R. W. Johnson, L. Pedley and R. Parsons, Mr. J. Gresty (then National Parks Ranger, Brisbane), the late Mr. W. T. Jones (C.S.I.R.O., Brisbane), Dr. L. J. Webb and Mr. J. G. Tracy (C.S.I.R.O., Brisbane), Mr. W. G. Trapnell (then of the Botanic Gardens, Brisbane), Dr. H. T. Clifford (University of Queensland), Mr. R. Jones (then of the University of Queensland), Mr. F. D. Hockings

* Now deceased.

(Brisbane, late of Springbrook), Dr. R. F. Thorne (during his Fulbright Fellowship at Brisbane, now Rancho Santa Ana Botanic Garden, Claremont, California), Mr. N. Forde (late of C.S.I.R.O., Alice Springs), Dr. Hj. Eichler (Adelaide), Mr. M. Gray (C.S.I.R.O., Canberra), Dr. H. S. McKee (then of C.S.I.R.O., Canberra), Dr. D. L. Goodall (then C.S.I.R.O., Mareeba), Dr. F. W. Whitehouse (Brisbane), Professor C. C. Renwick (Hunter Valley Research Foundation) and Dr. Otto Degener (Hawaii); seed was received from Mr. J. H. Willis (Melbourne) and Mr. J. S. Womersley (Lae). Through the active interest of the Curator, Mr. H. W. Caulfield, and Mr. Trapnell (then Foreman), many plants were grown in the Brisbane Botanic Gardens.

Dr. L. E. Codd (Botanical Research Institute, Pretoria) sent dried specimens of several South African species. Dr. H. T. Clifford examined the fertility of pollen from many plants. Dr. B. A. Barlow (then of the University of Queensland) and my colleague Mr. R. J. F. Henderson determined the chromosome number of some species; Mr. Henderson also examined the anatomy of the petiole of a few species. Dr. A. R. Brimblecombe (Deputy Government Entomologist, Department of Primary Industries, Brisbane) identified insects caught visiting the flowers and checked the nomenclature of others previously reported. My wife helped in collecting and caring for the living collection in our home garden.

Miss Rosemary Simmonds (now Mrs. W. C. S. Goodchild) made the drawings from which Figs. 6A, 13, 15, 18, 20, 24, and 25 were prepared while she was a member of our staff. Most of the photographs used for Figs. 5–28 were taken by Mr. G. E. Cripps (Photography Section, Department of Primary Industries, Brisbane) or were copies made by him; of the latter, the types figured in Figs. 7, 11, 17 and 21B were photographed by the British Museum (Nat. Hist.) Studio and are published by permission of the Trustees of the British Museum (Nat. Hist.), Fig. 21A was photographed at the Berlin Herbarium and is published by permission of the Director, Fig. 28B was photographed by the photographer, Royal Botanic Gardens, Kew, and published by permission of the Director, and Figs. 5 and 6B are from my photographs (colour transparencies except 5E).

HISTORY

Plectranthus L'Herit. Stirp. Nov. 84 verso (Mar. 1788) was described with two species, *P. punctatus* (L. f.) L'Herit. (*Ocimum punctatum* L. f.) and *P. fruticosus* L'Herit. About the same time *Germanea* Lamk. Enc. 2:690 (Apr. 1788) was described, also with two species, *G. urticifolia* Lamk. and *G. maculosa* Lamk. *P. fruticosus* and *G. urticifolia* proved to be conspecific and the two generic names were therefore treated as synonymous; there was however some diversity of opinion as to the correct name, the exact dates of publication being unknown until that of *Plectranthus* was established by Britten and Woodward, J. Bot. 43:268 (1905) in a study of L'Heritier's work and that of *Germanea* by Rothmaler, Chronica Botanica 5:439 (1939) in a study of Lamarck's Encyclopédie. Because of this uncertainty, *Plectranthus* (" 1785 or 1788 ") was conserved against *Germanea* (" 1786 or 1787 "), with *P. punctatus* as lectotype. With the dates established as above there is no need for conservation because *Plectranthus* has priority. In Taxon 6:239 (1957) Bullock and Killick suggested that *P. punctatus* was chosen as lectotype merely because its

basionym was older than *P. fruticosus* since no reasons were given in the proposal. Phillips, Gen. S. Afr. Fl. Pl. ed. 2:650 (1951) quoted *P. fruticosus* as lectotype also without discussion. Bullock and Killick think Phillips's choice should be adopted, because the characters of this species agree better with L'Heritier's generic description especially as to the spur on the corolla that suggested the generic name, the lower calyx-lobes and the stamens, the description of these not being applicable to *Ocimum punctatum* which has united filaments and no spur to the corolla-tube. This suggestion, already put forward by Nakai (Bot. Mag. Tokyo 48:785 (1934)), has been accepted by the Committee of Spermatophyta (Taxon 7:188 (1958), and the IXth International Botanical Congress (Rickett & Stafleu, Taxon 9:85 (1960); *P. fruticosus* is listed as *typus conservandus* in ICBN.

Bentham, Lab. Gen. et Spec. 29–47, 709–711 (1832–6), published the first monograph of the genus; he gave a revised account in DC. Prodr. 12:55–70 (1848) and an account of the Australian species in Fl. Aust. 5:77–79 (1870). The genus included those species with declinate stamens (Tribe Ocimoideae), free filaments, declinate lower lip of the corolla formed of a single large concave lobe, and a calyx enlarged in fruit with teeth not spiny, open at the mouth; *Coleus* Lour. has filaments united into a tube around the style. Bentham recognized about 45 species in 1836 and 65 in 1848 and he arranged them in seven sections. Most were nearly equally distributed between sect. *Isodon* Benth. (based on *Isodon* Schrad. in herb.) and sect. *Coleoides* Benth., the remaining sections being *Germanea* (Lamk.) Benth., *Pyramidium* Benth., *Amethystoides* Benth., *Melissoides* Benth., and *Heterocyclix* Benth. In Benth. & Hook. Gen. Pl. 2:1175 (1876) Bentham revised this arrangement recognizing two primary groups. Sect. *Isodon*, with *Isodon*, *Pyramidium*, *Amethystoides* and *Melissoides* as subsections, was distinguished by the calyx being equally 5-toothed, or 2-lipped with the upper lip composed of 3 teeth and the lower of 2 teeth; the two cymes of each verticillaster are more or less distinctly pedunculate and branched. In sect. *Germanea* with *Germanea* and *Coleoides* as subsections the calyx is 2-lipped with the upper lip composed of a single broad lobe and the lower lip of four narrower acute or acuminate teeth; the cymes are sessile with the pedicels proceeding almost from the axis of the inflorescence, at least in the great majority of species. Much the same arrangement was adopted by Briquet in Engl. & Prantl, Natürl. Pfl.-fam. IV, 3a: 352–357 (1895), but *Isodon* and *Germanea* were treated as subgenera and most of the other groups as sections with the addition of a new section *Aulanthus* under *Isodon*; about 90 species were recognized. This concept of *Isodon* was treated as generically distinct by Kudo, Mem. Fac. Sci. & Agr. Taihoku Imp. Univ. 2 (2): 118–141 (1929); he used the name *Isodon* for it, attributing it to Schrader, but Schrader never published the name and Kudo himself was the first to use it for the name of a genus. Codd, Taxon 17: 239 (1968) accepted Kudo's concept of *Isodon*, treating *Homalocheilos* J. K. Morton as congeneric. I agree with Kudo and Codd, but there is an earlier name for the genus, *Rabdosia* (Bl.) Hassk. Flora 25, Beibl. 2: 25 (1842) based on *Elsholtzia* Willd. sect. *Rabdosia* Bl. Bijdr. Fl. Nederl. Indië 825 (1825) the type of which is *E. javanica* Bl. loc. cit. (*Rabdosia javanica* (Bl.) Hassk. loc. cit., *Plectranthus javanicus* (Bl.) Benth.). In Bot. Mag. Tokyo 48: 785 (1934) Nakai described *Amethystanthus* Nakai for the species referred to *Plectranthus* sect. *Amethystoides* and some of those referred to sect. *Aulanthus* and other sections, all

said to have the calyx 2-lipped with the upper lip 3-toothed or 3-fid; *Isodon* was restricted to species with an equally 5-lobed calyx and an indumentum of stellate hairs, but Nakai must have been mistaken about the hairs. In J. Bot. Lond. 74: 35 (1936) G. Taylor validated the name *Ceratanthus* F. Muell. for a group of species he treated as generically distinct, typified by *Plectranthus longicornis* F. Muell. from Queensland and New Guinea, placed by Briquet in subgen. *Germanea* sect. *Germanea*; *Hemsleia* Kudo op. cit. 142 non *Hemsleya* Cogn. (1889) is synonymous, but neither Bentham nor Briquet mentioned the sectional name *Cornigera* F. Muell. proposed for *P. longicornis*.

From the key to the genera in Hutchinson & Dalziell, Fl. W. Trop. Afr. 2: 279 (1931), the remarks of Burtt in Bot. Mag. sub t. 9616 (1942), and the studies of J. K. Morton, J. Linn. Soc. Bot. 58: 231–283 (1962) it would appear that some African species referred to *Plectranthus* and *Coleus* have not been correctly placed. Morton recognized other genera, mostly of few species, including *Homalocheilos* J. K. Morton op. cit. 268, Figs. 6, 4C; as mentioned above this is indistinguishable from *Rabdosia* (*Isodon*) which Morton did not discuss. He believed that the uncertainty or variability in the union of stamens in some species was evidence that *Coleus* could not be distinguished from *Plectranthus*. Launert treated these as congeneric in Mitt. Bot. München 7: 295–303 (1968). In his revision of the Malesian Labiatae in Gard. Bull. Sing. 24: 13–180 (1969) H. Keng accepted *Ceratanthus* as distinct but otherwise followed Bentham and Briquet in his concept of *Plectranthus* and *Coleus*. He referred (p. 49) to Morton's opinion on these but preferred to keep them distinct because he believed that the classification in the family was " basically arbitrary " and that if Morton's key was applied to Malesian species " the most widely cultivated labiateous species in [the] Malesian region, *Coleus scutellarioides* probably has to be reclassified under the genus *Solenostemon* . . . rather than under the genus *Plectranthus*. This appears to be unacceptable."

However, the type species of *Coleus*, *C. amboinicus* Lour., is quite different from many other species referred to the genus and from all species of *Plectranthus* in its scarcely declinate fruiting calyx* having a long broad uppermost lobe with four short very narrow lower lobes (Fig. 1I), stamens with the filaments united to beyond the middle into a long tube split on the upper side, and compact cymes. Most of the Asiatic-Australasian species commonly referred to *Coleus* including *C. scutellarioides* (L.) Benth. (to which Keng (p. 51) has referred the widely cultivated C. *blumei* Benth. and other forms) have a calyx (Fig. 1J) with the two lowermost teeth the longest and united for the greater part, short often very blunt lateral teeth, very sharply bent corolla-tube, stamens ± distinctly united but only in the lower part, and loose cymes; these characters do agree with those of *Solenostemon* Thonning as understood by Morton, op. cit. 251–7.

I have no doubt that *Rabdosia* (*Isodon*), *Ceratanthus* and *Coleus* are generically distinct from *Plectranthus* and little doubt that *Solenostemon* is likewise distinct but its exact limits can only be determined after a detailed study of plants from Africa,

* I have seen the calyx considerably enlarged after flowering but not with ripe fruit.

Asia, Australia and the Pacific. A re-examination of *Coleus scutellarioides* over its entire range needs to be carried out before any transfers are made. As a basis for further study the genera may be briefly circumscribed as follows:

Ceratanthus. Stamens free, inserted at two different levels, two near the mouth of the tube with glabrous filaments, two towards the base of the tube with the filaments pubescent at least towards the base; calyx 2-lipped with the upper lip formed of a broad shortly decurrent uppermost lobe and two small triangular lateral lobes and the broad truncate or emarginate lower lip of the two completely or almost completely united lower lobes; corolla with a long horizontal to ± erect spur at the base; nutlets oblong or oblong-elliptic in outline, ± scrobiculate; herbs, sometimes scapigerous, with compact few-flowered verticillasters.

Coleus. Stamens united for at least half their length into a tube split on the upper side inserted near the mouth of the corolla-tube, glabrous; calyx (Fig. 1I) 2-lipped, the upper lip of a single broad lobe much longer than the four short narrow subsimilar lobes of the lower lip; corolla-tube abruptly twice bent, neither spurred nor gibbous; nutlets ± circular in outline (always?); semi-succulent subshrubs or perennial herbs? with compact sometimes many-flowered verticillasters. With this circumscription, *Coleus* includes sect. *Calceolus* Benth. but this differs considerably in its calyx and anatomy of the petiole and may better be treated as a separate genus. Of the species examined by Mr. Henderson, *C. amboinicus* has an arrangement of the vascular bundles in the petiole resembling that figured for *Phlomis tuberosus* by Metcalf & Chalk, Anat. Dicot. 2: Fig. 250H (1950) which is quite different from that in *Coleus* sect. *Calceolus* (cf. Fig. 250C, but in the species examined, *C. spicatus*, the arrangement is more like that in Fig. 250A) and in *Solenostemon* and *Plectranthus* in which it resembles Fig. 250E (*Lycopus*).

Solenostemon. Stamens very shortly and sometimes irregularly united at the base, glabrous, inserted near the mouth of the corolla-tube; calyx (Fig. 1J) with a broad uppermost lobe, short often broad and blunt lateral lobes and two narrow lowermost lobes united for the greater part and ± longer than the uppermost, the whole ± 2-lipped but the lateral lobes belonging as much to the upper lip as the lower; corolla-tube sharply twice bent, not spurred; nutlets very broadly ovate or ± circular in outline; ± shrubby, somewhat succulent (always?) plants with the cymes of the verticillasters loose, pedunculate.

Rabdosia. Stamens free, inserted near the mouth of the tube, glabrous (except in one species); calyx (Fig. 1K) about equally 5-lobed or the uppermost slightly smaller than the others, if 2-lipped then the upper lip 3-lobed and the lower 2-lobed; corolla mostly less conspicuously bent or gibbous than in *Plectranthus* much less so than in *Coleus* and *Solenostemon,* with a small spur in one species; nutlets (? always) ± elliptic in outline and hence narrower than in *Plectranthus;* herbs or ± shrubby, not succulent (?), with very loose cymes with conspicuous peduncles and axes so that the inflorescence tends to be an open panicle.

Plectranthus. Stamens free, inserted near the mouth of the corolla-tube, glabrous; calyx (Fig. 1 A–H) clearly 2-lipped, the upper lip of a single broad lobe scarcely if at all decurrent on the tube and little if at all longer than the lower lip, the latter of four much narrower lobes, the two lowermost not much more united to one another than they are to the lateral ones; corolla-tube variously gibbous to ± sigmoid, sometimes with a basal spur; nutlets broadly ovate-elliptic to circular in outline; herbs, subshrubs or shrubs, often somewhat succulent with compact few- to many-flowered verticillasters, the cymes ± sessile without conspicuous axes.

As limited here *Plectranthus* comprises about 100 species ranging over much of Africa, southern Asia, Malesia, Australia and eastward to Hawaii (Fig. 30). There are two notable discontinuities, one in western Asia and the other between the Asiatic mainland (Perak) and Timor except for one species in eastern Java.

In Australia, specimens of *Plectranthus* were first collected on the east coast by Banks and Solander in 1770 and R. Brown in 1802, and in the islands of the Pacific on Tana (Tanna) by J. R. and G. Forster in 1774. The first published account was that of R. Brown, Prodr. 505–6 (1810), but Brown included species now referred to *Basilicum* Moench (*Moschosma* Reichenb.) and *Coleus*. Excluding these, *P. australis* R. Br., *P. graveolens* R. Br. and *P. congestus* R. Br. were described, the last mentioned based entirely on specimens collected by Banks and Solander. Bentham in 1832 identified *P. graveolens* with *P. parviflorus* Willd. based on plants cultivated in Berlin, quoted as another synonym *P. paniculatus* Jacq. also based on cultivated plants (in Vienna), described *P. foetidus* from other specimens collected by Banks and Solander, *P. forsteri* from those collected by the Forsters, *P. sieberi* in the Supplementum (1835), and *P. parviflorus* var. ? *elatior* in 1848; all were referred to sect. *Coleoides*. In Fl. Aust. he identified *P. australis*, *P. graveolens* and *P. forsteri* with *P. parviflorus* Willd., omitted any reference to *P. parviflorus* var. ? *elatior*, *P. sieberi*, *P. paniculatus* and *P. foetidus*, but included the recently described *P. longicornis* F. Muell. without reference to any sections of the genus.

Briquet referred the Australian species to subgen. *Germanea*, with *P. longicornis* in sect. *Germanea* and the others grouped with some African and Asiatic species in sect. *Coleoides* subsect. *Vulgares* Briq. ser. *Polyanthi* Briq. His concept of species followed that of Bentham's in 1848 except that *P. australis* and *P. graveolens* were treated as varieties of *P. parviflorus*. F. Mueller generally followed Fl. Aust. except that he accepted *P. foetidus* and sometimes wrote *Plectranthus parviflorus* Henckel which was copied by some later botanists. F. M. Bailey thought there were two varieties of *P. parviflorus* Willd. Domin used the name *P. australis* and described taxa of lower rank within the species; details are given below in the accounts of *P. parviflorus* and *P. graveolens*.

Specimens prepared without artificial heat or other special treatment tend to shed leaves during drying and many early collections are very scrappy. It is easily understood why Bentham and others failed to recognize from the scraps some of the species described here as new and why any differences noted were believed to

be evidence of wide variation in a very few species, but it is also necessary to point out that some of the new species described below were first found in relatively recent times at least three of them since the beginning of this study.

The best herbarium material was prepared by first placing each specimen in a folder, sprinkling it with formalin, lightly pressing and enclosing the whole in a plastic bag for at least thirty hours. The specimens in their folders were then transferred to an ordinary press using drying paper and corrugates between each folder. Drying was carried out by artificial heat. Towards the end of the study alcohol was used instead of formalin.

THE AUSTRALASIAN SPECIES IN MEDICINE AND HORTICULTURE

Medicine. According to the label to *Armit* 758 (MEL), *Plectranthus parviflorus* was used in medicine by the aborigines of the Robertson River (northern Queensland) in treating syphilitic diseases, the leaves being used as a poultice and an infusion as a wash. Seeman Fl. Vit. 192 (1866) wrote of *P. forsteri:* " The leaves are aromatic and in repute amongst the natives as a cure for " bad eyes " and headaches. They are also recommended for coughs and colds." Kajewski, on the label to *Kajewski* 258 (BRI) and quoted by Guillaumin, J. Arnold Arb. 13: 29 (1932) stated that the natives (of Eromanga, New Hebrides) used the sap of the same species mixed with salt water for treating sores, and Däniker on the label to *Däniker* 1938$\frac{7}{4}$(Z) from the Loyalty Is. stated that it was used for skin diseases. Roth, North Qd Ethnogr. Bull. 5 (1903) quoted by Webb, C.S.I.R. Bull. 232: 68 (1948) reported that aborigines in northern Queensland crushed the leaves and branches of *P. congestus* in water and drank the infusion for internal complaints, but I have been unable to verify the identification of the plant.

Horticulture.—Plectranthus parviflorus was cultivated in Europe in 1805 if not before and in England in 1824 (Lodd. Bot. Cab. 1185). But this is possibly the least attractive of Australian species. *P. spectabilis* was raised at the Edinburgh Botanic Garden, whence specimens were sent to Kew in 1883 and described by J. D. Hooker and figured in Bot. Mag. t. 6792 under the name of *P. foetidus*; Hooker wrote enthusiastically of this " very striking . . . well worthy of cultivation ". A form of *P. forsteri* with leaves edged with cream or yellow has been cultivated for its foliage at least in Australia and the United States under the name of *P. coleoides* (a name rightfully belonging to a very different Indian species) or *P. coleoides* ' Marginatus ' (cf. G. R. Robinson, Gardn. Chron. 151: 456 (1962) and Graf, Exotica ed. 3: 1021, 1693 (1963)); the accounts of *P. parviflorus* or *P. australis* by these authors refer to the African *P. verticillatus* (L. f.) Druce (*P. thunbergii* Benth.). *P. argentatus* has been cultivated around Brisbane to some extent during recent years chiefly because of the silvery young foliage (Fig. 5C). The intensely blue flowers of most species, the somewhat colourful foliage of some, their hardiness, and ease of propagation from cuttings should lead to a wider use as the species become better known, but the roots are subject to invasion by nematodes.

CITATIONS

References to literature have been restricted to protologues and others requiring comment. All collections cited have been examined, unless marked " not seen ". In the great majority of cases it has been thought unnecessary to cite the herbaria housing the specimens cited. Specimens from cultivated plants are cited in parentheses following the citation of the wild collection; if the latter was not in flower or fruit no specimen would be prepared for the herbarium and this is shown by the letters *n.s.* (no specimen, nullum specimen). Unless stated otherwise, plants in cultivation were grown in Brisbane, mostly in my own garden. References to ICBN are to the International Code of Botanical Nomenclature (1966).

TAXONOMY AND DISTRIBUTION

Plectranthus L'Herit. Stirp. Nov. 84 verso (Mar. 1788), nom. conserv. Typ. conserv.: *P. fruticosus* L'Herit.

Germanea Lamk. Enc. 2: 690 (Apr. 1788). Syntypes: *G. urticifolia* Lamk. and *G. maculosa* Lamk.

Calyx 2-lipped, campanulate, appressed to the corolla-tube in flower, much enlarged in fruit when it is ± declinate, ± gibbous at base, scarious, 10-ribbed and venulose, the upper lip of one ± ovate to broader than long, ± recurved lobe broader than the others, the lower lip 4-lobed, the lobes ± triangular, acute or acuminate. Corolla 2-lipped; tube variously bent to nearly straight, commonly more or less gibbous to saccate or even spurred on the upper side; upper lip 4-lobed; lower lip concave or cymbiform. Stamens 4, declinate; filaments inserted near the mouth of the tube, free, glabrous; anthers subcircular or somewhat wider than long, medifixed, 1-celled. Disc produced into a gland in front. Ovary 4-partite to the base. Style glabrous, shortly 2-lobed at the apex; lobes narrow, subacute. Nutlets basifixed, ± globose, smooth or pitted.—Herbs or shrubs, nearly always glandular at least on the lower surface of the leaves and the calyx. Verticillasters along the axis of simple or branched racemes, the cymes sessile or nearly so.

The Australasian species are ± pubescent or villous low shrubs rarely as high as 1·5 m, subshrubs or perennial herbs with more or less fleshy stems and leaves, or the lower part of the stem becoming woody with age, the indumentum consisting of antrorse, divaricate or retrorse uniseriate 3–14-celled (rarely 2-celled), acute, ± curved trichomes often mixed, at least in the inflorescence and even there sometimes sparsely, with short (sometimes minute), divaricate 2-celled glandular hairs with the upper cell the wider, ± obovoid and ± acute; the ± globose sessile or nearly sessile glands characteristic of the family are abundant in most species, usually yellowish to dull red. Other characters possessed in common are:—Leaves opposite, those of each pair slightly unequal in size and length of petiole; blade ± ovate (narrowly so in *P. alloplectus*) to subcircular, the base varying from broadly cuneate to truncate or subcordate even on the same plant, ± decurrent on the petiole except sometimes in *P. klossii;* margins dentate to crenate except near the base, some teeth sometimes with secondary teeth; veins in mostly 5–7 rarely 3 pairs, impressed above and raised beneath like the midrib and major reticulations, producing a ± bullate effect in life

that is often lost on the dried specimen; hairs antrorse or retrorse on the lower surface corresponding with the direction of the non-glandular hairs on the stem. Racemes usually 1–3 together, but in *P. congestus*, *P. petraeus*, *P. spectabilis* (Figs. 25–27) and occasionally in other species, they are more numerous and ± paniculate. Bracts ovate or ± trullate to subcircular, sometimes ± attenuate at base especially in the lower part of the raceme, acute or obtuse, hairy and usually glandular outside with hairs and glands resembling those on the lower surface of the leaf, also ciliate, glabrous and eglandular within (except for *P. argentatus*), in most species falling long before the flowers expand. Verticillasters at least 6-flowered. Calyx in flower ± oblique on the pedicel with an indumentum resembling that of the lower surface of the leaves, the tips of the lower lobes not reaching the submedian bend of the corolla-tube to ± surpassing it; after the corolla falls the lobes converge while the fruit ripens. Fruiting calyx declinate (usually strongly so), ribbed and venulose, ± gibbous at base, incurved with the lobes about as long as or a little longer than the tube, variously hairy to glabrescent and usually with sessile glands; upper lip soon becoming erect then reflexed with recurved margins; lateral lobes slightly the shortest (in most species) to as long as or somewhat longer than the upper lip, obliquely triangular and often ± falcate, in some rather narrowly so, subulate-acute; lowermost slightly the longest, narrowly triangular, subulate-acute or setaceously acuminate, not more connate than the laterals. Corolla predominantly violet to blue (faintly so in *P. argentatus*, *P. forsteri*, and some states of *P. parviflorus*), the colour most intense as a suffusion on the lower part of the uppermost lobes, an intramarginal band on the lateral lobes extending below the junction with the uppermost, and usually on the lower lip, sometimes tinged with mauve on the tube, the throat and tube paler to whitish and the lateral lobes with a white median band; on the Wilson Colour Chart these colours range from Violet 36 to Gentian Blue 42 with their shades and tints from Victoria Violet 738/3 and Cornflower Blue 742 to Heliotrope 636 and Flax Blue 642/3. Tube laterally compressed especially upwards, commonly widened towards the mouth, ± bent or curved upwards very shortly above the base, except in *P. petraeus* and sometimes in *P. forsteri*, bent or curved downward near the middle where it is more or less swollen at the bend on the upper side except in *P. forsteri* and *P. petraeus*, and with a ± irregular ring of small hairs inside near the base and sometimes a few more further up the tube; mouth oblique, a line from top to bottom making an angle of about 40–50° with the bottom of the tube. Upper lip spreading to reflexed, unequally 4-lobed; uppermost lobes the larger, broadly rounded, glandular outside except in *P. mirus;* lateral lobes at a lower level, much smaller, suboblong, obliquely rounded, and nearly erect except in *P. graveolens* where they are somewhat spreading, commonly glabrous and eglandular. Lower lip concave, broadly ovate or very broadly ovate when flattened but ± spathulate in *P. petraeus*, very much narrowed at the base, from distinctly shorter to distinctly longer than the tube, at first upcurved, then ± porrect, never reflexed. Stamens and style usually slightly or in *P. alloplectus* much exserted from the lower lip, at least the anthers blue; lower pair of stamens slightly the longer; anthers 2-celled and somewhat reniform when young, the cells soon becoming confluent, opening by a single transverse slit and becoming transversely elliptic; pollen mostly deep yellow (pale yellow in *P. argentatus*), oblong-elliptic in broadest view when fresh. Nutlets with rounded

edges, broadly elliptic or subcircular in outline, commonly also somewhat ovate, trigonous in transverse section, slightly variable on the same plant, shining, dark brown or black, smooth or nearly so before wetting, with a very large number of mucilage hairs invisible when dry; on wetting, the hairs become erect and the nutlet is then ± enclosed in mucilage; on drying again the hairs retract but sometimes unevenly so, and the nut may appear ± verruculose. Cleistogamous flowers with small, short-tubed corollas have been found in *P. parviflorus*, especially early and late in the flowering season.

Dr. B. A. Barlow examined the chromosomes of *P. parviflorus* (*Blake 21647*) and *P. graveolens* (*Blake 21649*); in both $n = 16$, but Mr. R. J. F. Henderson found $2n = 34$ in other species.

In the lectotype and some other African species the calyx is nearly porrect in flower; the tube is much shorter than the lips the lower of which has all teeth directed forward with the lower teeth united to one another well above their union with the laterals; the fruiting calyx becomes more declinate with a ± incurving lower lip. The tube of the corolla has a short nearly straight ascending part at the base and is then suddenly widened in an upward direction, bent downwards and narrowed to the mouth; the lower lip is shorter than the upper and deflexed. In *P. fruticosus* the dilatation of the tube is produced backwards into a spur which in the closely allied *P. saccatus* Benth. is replaced by a gibbosity and there is a gradual series of variations (Fig. 1 A–H) towards the form in the Australian species through *P. oertendahlii* T.C.E. Fries, *P. ciliatus* E. Meyer, *P. verticillatus* (L.f.) Druce, *P. hirtus* Benth. (and *P. woodii* Guerke) to *P. draconis* Briq. and *P. zeylanicus* Benth. (*P. tomentosus* Benth.). On the other hand, *P. ecklonii* Benth. has an almost straight tube. There are comparable series of variations in the direction of the lower lip of the corolla and form of the calyx; a more or less porrect lower lip of the corolla is found in *P. ciliatus* and succeeding species and a calyx comparable with that of most Australian species in *P. hirtus* and succeeding species. The close resemblance of *P. zeylanicus* to Australian species and its nomenclature is discussed below under *P. parviflorus*.

DIAGNOSTIC CHARACTERS

Plants of all Australian species have grown and flowered in my garden and I have seen twelve of them flowering in the field. There is no greater difference between wild and cultivated plants than there is between individuals growing wild. The descriptions in this paper have been prepared from both living and dried material but most of the figures are from fresh material except for the herbarium specimens shown in Figs. 7, 11, 16, 17, 21, 22, 27, 28. There is considerable shrinkage during drying as might be expected from the semisucculent nature of the plants and this may change the shape of the leaf and the appearance of the indumentum, but the key to the species may be used with either living or dried material.

The way in which some characters are shared between the species is shown in Fig. 29.

In the *indumentum* (Fig. 2) the non-glandular hairs are present on all above-ground parts of all species except the androecium and pistil. In one group of species all these hairs are antrorse, often strongly so, but in the majority these hairs are

spreading to sharply reflexed on the stems and branches (except often for a line of long hairs at the nodes), the undersurface of the leaves (including the petiole), the axis of the inflorescence, and sometimes also on the pedicels and base of calyx. There is often considerable variation in length of these hairs and on individuals of several species they may often be recognizable as longer and shorter. The density, especially of the longer hairs, varies greatly between individuals in some species but except in *P. diversus* the direction is constant, easily seen especially on fresh specimens, and I have used it as the first character in the key although it does not appear to be constantly associated with any other character. On dried specimens the direction may not be obvious at first because of distortion; the hairs may twist and their direction may become partly obscured, or they may break towards the base and shrinkage near the break may cause many to resemble the gland-tipped hairs described below; also the cells of the hairs dry laterally flattened, with the planes of flattening of contiguous cells at right angles to one another. Observations on the hairs on dried specimens are often best made on the side of the stem perpendicular to the plane of the paper. Prominent divaricate gland-tipped hairs 0·1–0·6 mm long are abundant on the branches, underside (at least) of leaves, axis of the racemes and the calyx of *P. graveolens*, *P. intraterraneus*, *P. mirus* and *P. suaveolens* and in the inflorescence of *P. parviflorus* and *P. klossii;* they are also present on *P. foetidus.* These should be distinguished from the very small ones of similar structure but only 0·02–0·05 (rarely to 0·1) mm long found sometimes sporadically in other species and referred to in the keys and descriptions as " minute gland-tipped hairs "; the latter are usually sparse unless associated with the former, difficult to see and of little diagnostic value. The larger gland-tipped hairs are readily seen with a hand lens and, provided they are distinguished from broken non-glandular hairs, are a very useful character; they are unusually irregular in size and number in *P. foetidus* where they are often more or less completely hidden by the length and density of the other hairs. Some of the longer antrorse hairs on the upper surface of the leaf in *P. suaveolens* are gland-tipped. Sessile, globose or depressed globose glands are almost entirely absent from *P. mirus*, *P. suaveolens* and some plants of *P. diversus* and *P. petraeus;* in all other species they are frequent to abundant on the lower side of the leaf, the axis of the raceme (absent from *P. gratus*, *P. klossii* and *P. foetidus*, sparse in some others), and usually on the stems; usually they are 8-celled and yellowish to dull red, but 4-celled in *P. argentatus* and *P. klossii*, usually 4-celled on the stems of *P. congestus*, and often colourless when present on *P. suaveolens.*

The leaves (Figs. 5–27) are ± narrowly ovate in *P. alloplectus* (2½–2 times as long as wide, Fig. 14), mostly ovate to subcircular in all the others or on dried specimens sometimes approaching narrowly ovate or ± trullate due to shrinkage; size and (except for *P. alloplectus*) shape have little diagnostic value. Leaves are usually more or less bullate on the upper surface between the veins, but relatively thin-textured leaves dry nearly flat; texture has little diagnostic value. The margin however affords a very good character, the number of teeth varying within definite limits for each species. Stunted plants tend to have small leaves with fewer teeth than usual for the species and very luxuriant plants growing in unusually shady or damp situations sometimes have a few leaves with more teeth than usual. If these more or less abnormal states be ignored the species may be arranged in two

groups, those having 3–10 teeth on each side (excluding the terminal tooth) being *P. forsteri*, *P. intraterraneus*, *P. klossii* and *P. parviflorus*, and the remainder with 9–34 pairs of teeth. The number of teeth on each side of any leaf may not be quite the same, but I have used " pairs of teeth " for convenience. The teeth vary much in size and shape in *P. parviflorus*, are sometimes obscure in *P. forsteri* and very small on the lower part of some leaves of *P. alloplectus*, and on the whole their shape seems to offer no diagnostic character.

The petiole is commonly $\frac{1}{5}$–$\frac{1}{2}$ as long as the blade, but in *P. forsteri* the petiole is at least half as long and sometimes as long as the blade, in *P. parviflorus* and *P. graveolens* it is frequently up to $\frac{2}{3}$ as long and in *P. alloplectus*, *P. gratus*, *P. foetidus*, *P. klossii* and *P. spectabilis* it is commonly less than $\frac{1}{3}$.

The *racemes* vary much in length and usually become much elongated as flowering proceeds; they are shorter in *P. amicorum*, *P. foetidus* and *P. spectabilis* than in other species. Usually 1–3 on each branch, they are often numerous on the stems or branches of *P. congestus*, *P. petraeus* and *P. spectabilis* and the upper part of the stem becomes a much branched sometimes paniculate inflorescence more or less leafy at the base (Figs. 25–27). The verticillasters are usually well spaced with 6–10 flowers and prominent pedicels; the pedicels are short in *P. alloplectus;* in *P. congestus*, *P. foetidus* and *P. spectabilis* the verticillasters are ± contiguous with short pedicels and in *P. congestus* the flowers are commonly numerous, often 20–50 in each verticillaster. A few species have verticillasters with commonly between 10 and 20 flowers.

The *bracts* vary in size and shape in different parts of the inflorescence, those towards the top of old inflorescences being the smallest and narrowest. They are conspicuously large (2·5–6 mm long) in *P. foetidus* (Fig. 10), *P. mirus* and *P. spectabilis* (Fig. 25), mostly less than 2·5 mm in most of the others; in *P. alloplectus* and *P. graveolens* they are intermediate in size and unusually persistent in the former.

The *calyx*, especially the enlarged fruiting calyx, offers some very important diagnostic characters (Figs. 3, 4). In most species it is lobed to about the middle, with the upper lobe very broadly ovate or subcircular sometimes somewhat wider than long and usually obtuse with or without a small point; but in *P. foetidus* (Fig. 3D), *P. spectabilis* (Fig. 4F) and *P. mirus* (Fig. 3C) it is somewhat more deeply lobed with the upper lobe narrowly ovate to ovate and acute or ± triangular; the lowermost lobes are especially narrow and less rigid than usual in *P. foetidus* and *P. spectabilis*. *P. congestus* has an unusually short but broad calyx with broad lower lobes (Fig. 4G). There is some variation in overall length in a single raceme, and on the whole there is not much difference between most of the species; the largest are found on *P. mirus* and the smallest on *P. congestus*, *P. alloplectus*, *P. forsteri* and some states of *P. parviflorus*.

The *corolla* (Figs. 3, 4) varies considerably in size even on the same plant but *P. forsteri* has an unsually small corolla with a relatively short lower lip and a nearly straight tube that has an angle only in the lower surface (Fig. 4C). In other species the three segments of the tube are more or less distinct and the angle near the middle on the lower side is a useful character. From the bend to the junction with the lower lip the lower surface of the tube is nearly straight and there is a prevailing direction

of the lower surface of the ascending segment; the angle is that of the intersection of these lines. It is very well defined and about 90°–120° in *P. amicorum*, *P. apreptus*, *P. diversus*, *P. gratus*, *P. foetidus* and *P. mirus*, still fairly sharp but wider, about 90°–130° in *P. graveolens*, more gently curved to about the same angle or up to 140° in most of the others, nearly straight in *P. argentatus* and *P. klossii*. *P. alloplectus* has a conspicuously large and deep lower lip. There are slight variations in the shape of the lateral lobes but the ± circular upper lobes show little variation. Except for *P. mirus* the limb is glandular on the outside of the upper lobes and—except usually in *P. parviflorus*—the lower lip, but glands are found on the lateral lobes of only *P. alloplectus*, *P. gratus*, *P. intraterraneus*, *P. klossii* and *P. forsteri* and then not constantly. The hairs of the upper lobes and lower lip are variable in length and density within some species, and in some they are present on the tube, rarely on the lateral lobes; only *P. amicorum* has all lobes ciliolate; gland-tipped hairs are usually present when these occur on the leaves.

The *stamens* and *style* are prominently exserted in *P. alloplectus* (Fig. 3G), distinctly so in *P. forsteri* and *P. mirus* and about as long as the lower lip in other species. The length of the style is correlated with the length of the stamens.

The *nutlets* do not vary much in shape, but there is noticeable variation in size within each species. On the whole *P. congestus* and *P. forsteri* have the smallest nutlets, *P. graveolens*, *P. mirus* and *P. intraterraneus* the largest and those of *P. parviflorus* extend through nearly the whole range.

In *habit*, most species are definitely shrubby with the stems living for several years at least, but *P. parviflorus* is as a rule definitely herbaceous with its stems dying down each year almost or quite to a tuberous base (Fig. 19). *P. apreptus*, *P. congestus*, *P. suaveolens* and perhaps *P. forsteri* are somewhat woody near the base which is not tuberous or irregularly so in *P. suaveolens* and a greater part of the lower part of the plant perennates than in *P. parviflorus* but none of the stems appears to perennate for more than 2–3 years; new stems arise from the lowermost nodes and from the " crown " of the plant. Tuberous roots have been observed on plants of *P. congestus*, but it is not known if this is a constant character; such roots have not been seen in other species though they are known to occur in a few African and Indian species. In most species the pairs of leaves are fairly equally distributed on the present year's shoot and the inflorescence arises abruptly from the topmost pair. In *P. congestus*, *P. spectabilis* and perhaps to a less extent in *P. foetidus* the upper 1–4 internodes become more or less elongated and the leaves and petioles conspicuously smaller with 1-noded flowering branches arising from the axils (Figs. 10, 25, 26); in *P. congestus* the greater part of the stem may be occupied by a ± leafy panicle of racemes.

Odours are characteristic of some species. Plants of *P. diversus*, *P. intraterraneus*, *P. mirus* and *P. suaveolens* emit a strong sweetish odour when handled and those of *P. graveolens* and the inflorescences of *P. parviflorus* a heavy somewhat foetid odour. *P. apreptus*, *P. argentatus* and some others have no definite odour.

ECOLOGY

The geographical distribution of the species is shown in Figs. 31–36. Some species have a wide distribution but there is a cluster of local endemics in northern Queensland and another in the extreme south-east part of Queensland and neighbouring part of New South Wales. There may be another local endemic in central Queensland not mapped. Most species are usually found on rock ledges or in crevices often on steep slopes or cliff sides and usually exposed to the morning sun (Fig. 5). *P. argentatus* tends to grown in less exposed situations (Fig. 5B) while *P. parviflorus* is found in a great variety of situations over a very wide area; some details are given in the discussion of the respective species. All species can withstand periods of drought but plants are severely damaged by frost and cold winds.

Two or three species frequently grow in close proximity in nature and flower at the same time, so there seems ample opportunity for crossing to occur, but only five examples of hybridism in nature have been recognized, two of them *P. graveolens* × *P. parviflorus* and one each of *P. argentatus* × *P. graveolens*, *P. argentatus* × *P. parviflorus* and *P. apreptus* × *P. foetidus*. In my garden however, occasional hybrids have appeared, some of them between very dissimilar parents. Their recognition as such rests on their possession of characters intermediate between those of their supposed parents and a low percentage of pollen stainable by carbol fuchsin. In the recognized species about 95%–100% of the pollen is stainable, in the hybrids only 23%–66%. The hybrids so far recognized are *P. argentatus* × *P. parviflorus; P. argentatus* × *P. spectabilis; P. gratus* × *P. spectabilis; P. parviflorus* × *P. spectabilis; P. graveolens* × *P. parviflorus.*

Flowers open at night and after remaining open for some days the corolla falls during the afternoon before it withers, carrying the style with it. Most if not all species have long flowering periods, lasting for several months. At least some plants are self-fertile to judge from self-sown seedlings in the garden. Small cleistogamous flowers have been seen on *P. parviflorus* (Fig. 4B*x–z*).

According to A. A. Hamilton, Proc. Linn. Soc. N.S.W. 23: 765 (1899), *P. parviflorus* is visited by the Lepidoptera, *Taractrocera papyria* Boisd. and *Lycaena labradus* Godt. (= *Zizeeria otis labradus* (Godt.)) and I have seen butterflies visiting other species on rare occasions. In my garden all species are freely visited by the honey bee, *Apis mellifera* L. and a native solitary bee *Anegilla pulchra* (Smith) and occasionally by the native small black honey bee, *Trigona carbonaria* Smith. All these insects are searching for nectar; the *Anegilla* often feeds while hovering and may not remove pollen as the other bees do.

KEY TO AUSTRALASIAN SPECIES

Indumentum on stem and axis (except sometimes at the nodes) and the lower surface of the leaves of divaricate to retrorse (2–18-celled) hairs, with or without short divaricate gland-tipped hairs; sometimes (on *P. diversus*) the direction uncertain or varying from retrorse to antrorse but then abundant gland-tipped hairs also present (some plants of No. 12, *P. forsteri* have all or some hairs retrorse but no gland-tipped hairs and leaves with 3–6 pairs of teeth):

Leaves with 9–34 pairs of teeth, sometimes 10–7 pairs on plants with close hoary indumentum on the stem or with abundant gland-tipped hairs:

Javanese plant, ± woolly; leaves 1·5–2·5 times as long as wide with petioles $\frac{1}{8}$–$\frac{1}{3}$ as long as blade; glands and gland-tipped hairs absent on stem; minute gland-tipped hairs on leaves; racemes many, ± paniculate, verticillasters contiguous upwards; corolla-tube in profile much widened upwards with its lower surface arcuate 17. *P. petraeus*

Non-Javanese plants with other combinations of characters; most leaves 1–1·5 times as long as wide except in *P. alloplectus* which has a short appressed whitish or silvery indumentum, petioles $\frac{1}{10}$–$\frac{1}{5}$ as long as blades and (as in some others) conspicuous glands on stem; corolla twice bent and ± sigmoid, weakly so in a few species or in one species nearly straight (bends indistinct) and not much widened upwards:

Gland-tipped hairs usually abundant on stem, lower surface of leaf and sometimes on the axis, sometimes hidden or partly replaced by an abundance of long many-celled acute hairs; coloured sessile glands sparse to absent on stem and upper side of leaf:

Fruiting calyx divided to about the middle with the upper lobe ovate to very broadly ovate; lateral lobes 1·5–2 times as long as wide; lower lobes 2·5–4 times as long as wide:

Calyx in flower 1·6–2·3 mm long, directed horizontally and downwards in fruit, its upper lip as wide as or wider than long, ± obtuse, not longer than the lateral lobes; longer hairs on internodes and lower surface of leaf divaricate to retrorse 1. *P. graveolens*

Calyx in flower 2·3–3·3 mm long, directed upwards in fruit, its upper lip from nearly as wide as to much narrower than long, ± acute, longer than the lateral lobes; some of the longer hairs on stem and lower surface of leaf ± antrorse; sessile glands sometimes rare 2. *P. diversus*

Fruiting calyx divided to the middle or beyond with the upper lobe narrowly ovate to ovate or ± triangular, acute; lateral lobes about 2·5–4 times as long as wide; lower lobes 4–5 times as long as wide:

Sessile glands absent at least from stem and leaves; surface of leaf easily visible between the hairs, teeth in 7–15 pairs; racemes lax-flowered 3. *P. mirus*

Sessile glands present on stem and leaves, ± hidden by long hairs; teeth in 12–34 pairs; racemes dense-flowered, at least upwards 4. *P. foetidus*

Gland-tipped hairs absent or few and minute, at least on stem and leaves; indumentum on stem ± dense, of short, closely appressed hairs silvery at least on the new shoots; coloured sessile glands ± abundant and usually easily seen on stem, both sides of leaf and axis:

Leaf-blades 1–1·5 times as long as wide, or up to twice as long on dried specimens; petioles about $\frac{1}{5}$–$\frac{1}{2}$ as long as the blade; stamens scarcely if at all exceeding the tip of the lower lip of the corolla; pedicels 2–4 mm long:

Leaves with 7–13 pairs of teeth, densely and shortly villous beneath; corolla ciliolate on all lobes, the tube sharply bent at an angle of 90°–120°; glands 8-celled 5. *P. amicorum*

Leaves with 11–23 pairs of teeth, pubescent beneath, chiefly on the veins; corolla with at least the lateral lobes and lower lip glabrous at least at and near the margin, the tube gently curved rather than bent, at an angle of about 160°; glands 4-celled 6. *P. agentatus*

Leaf-blades about 2–2·5 times as long as wide; petioles mostly less than $\frac{1}{3}$ ($\frac{1}{10}$–$\frac{1}{5}$) as long as the blade; stamens and style exceeding the lower lip of the corolla by 1·5–4·5 mm; pedicels 1–3 mm long 7. *P. alloplectus*

Leaves with 4–10 pairs of teeth (some of these sometimes with secondary teeth); axis of inflorescence with many gland-tipped hairs (*P. parviflorus* very rarely has up to 12 pairs of teeth but it has at most only few and minute gland-tipped hairs on the stem; see also No. 12, *P. forsteri*, some plants of which have retrorse hairs):

Axis of inflorescence with very few or no sessile globose ± coloured glands:

Stems densely shortly appressedly white pubescent; leaves without or with very few glands; corolla-tube prominently bent at an angle of 120°–130° 8. *P. suaveolens*

Stems hirsute; leaves with many glands at least on lower surface; corolla-tube slightly and gently curved at an angle of 120°–160° 9. *P. klossii*

Axis of inflorescence with many coloured sessile globose glands:

Stems and leaves with many gland-tipped hairs; shrub without a tuberous base; lateral lobes of fruiting calyx about 1·5 times as long as wide 10. *P. intraterraneus*

Stems and leaves with at most a few minute gland-tipped hairs; perennial herb or subshrub with a tuberous base; lateral lobes of fruiting calyx at least 1·5 times as long as wide 11. *P. parviflorus*

Indumentum of ± antrorse hairs throughout except on some plants of *P. forsteri*; gland-tipped hairs on stems, leaves and axis few and minute to absent; sessile glands absent or nearly absent from upper surface of leaf except in *P. forsteri*, usually also from axis and sometimes from stem; leaves on well grown plants usually with 7–18 pairs of teeth (fewer on *P. forsteri* and stunted plants of other species):

Calyx 1·8–3·3 mm long in flower, 3·5–5 mm long in fruit, with the upper lip as broad as or somewhat broader than long; verticillasters 8–15 mm apart with conspicuous hirtellous pedicels 2·5–7·5 mm long; stem with uppermost leaves not very different in size, length of petiole and disposition from those lower down; racemes 1–3, rarely 5:

Subshrubs, sparsely and shortly pubescent with hairs ± 0·5 mm long; petioles commonly $\frac{1}{3}$–$\frac{2}{3}$ as long as the blades; verticillasters 6–10-flowered with broadly ovate to narrowly ovate bracts:

Leaves with 3–6 pairs of teeth with fairly numerous glands on the upper surface and densely glandular beneath; glands also on stem; corolla usually 3–6 mm long with straight or constricted tube 12. *P. forsteri*

Leaves with 7–18 pairs of teeth without glands above and sparsely glandular beneath; no glands on stem; corolla 7–12 mm long with sharply and extensively bent tube (90°–120°) 13. *P. apreptus*

Shrub, densely pubescent with hairs up to 1 mm long; petioles commonly less than $\frac{1}{3}$ as long as blade; verticillasters 10–14-flowered with ovate to very broadly ovate bracts 14. *P. gratus*

Calyx either shorter than above or with the upper lip $\frac{1}{2}$–$\frac{2}{3}$ as wide as long; verticillasters ± closely approximated except at the base of the raceme, commonly with short to very short pedicels (rarely up to 4 mm or more); uppermost 2–3 pairs of leaves more distant, much smaller with short to very short petioles; racemes often many:

Shrub; calyx 1·8–2·7 mm long in flower, 3·5–4·5 mm in fruit, the upper lip narrowly subtriangular-ovate, acute; verticillasters up to 18-flowered 15. *P. spectabilis*

Perennial herb; calyx 1–1·6 mm long in flower, up to 3·2 mm in fruit with subcircular upper lip; verticillasters commonly 20–50-flowered except on stunted plants 16. *P. congestus*

1. Plectranthus graveolens R. Br. Prodr. 506 (1810). Lectotype: Queensland, Port Clinton, 22nd Aug. 1802, *R. Brown* (BM, photo BRI; K).

Plectranthus parviflorus " R. Br." var. *graveolens* (R. Br.) Briq. Natürl. Pfl.-fam. IV, 3a: 357 (1895). Based on *P. graveolens* R. Br.

Plectranthus australis R. Br. var. *graveolens* (R. Br.) Domin, Biblioth. Bot. 89: 565 (1928). Based on *P. graveolens* R. Br.

Loosely branched heavily scented shrub up to 1 m high; stems up to 12 mm thick in lower part; branches densely glandular-pubescent, also sparsely to densely pilose with spreading to retrorse hairs up to 1·6 mm long with up to 6 cells, and sometimes with a few reddish glands. Leaves green or dark green paler beneath; petioles (⅛–) ¼–⅔ as long as the blades; blades very broadly ovate or circular-ovate to ovate or also somewhat deltate or somewhat elliptic, acute to obtuse, subcordate to broadly cuneate, evenly crenate-dentate to near the base with 10–19 (–21) pairs of teeth, both sides densely villous and glandular-pubescent, the upper side with few or no glands, the lower densely glandular, mostly 4·5–10·5 cm long, 3·5–7·5 cm wide, 1–1·65 times as long as wide, ± bullate in the fresh state, less so when dry. Racemes 15–25 cm long; axis densely glandular-pubescent, also pilose and with a few glands; bracts broadly to very broadly deltate-ovate or trullate-ovate, in the latter case ± attenuate at base, broadly to very broadly acute or also slightly acuminate, 3·8–1·7 mm long; verticillasters 12–15-flowered, about 8–12 mm apart; pedicels 2–4·5 mm long. Flowers predominantly violet blue. Calyx 1·6–2·3 mm long; lower teeth from a little shorter than to slightly exceeding the bend in the corolla-tube. Corolla 8–9 mm long, tube sharply deflexed at an angle of 90°–130°, very oblique at the mouth, pubescent and glandular; uppermost lobes and lower lip pubescent and glandular; lateral lobes sometimes with a few glands, very obliquely elliptic-oblong. Fruiting calyx 4–5 mm long; upper lip about half as long, subcircular-ovate, obtuse or ± acute; lateral lobes 0·9–1·1 mm wide, 1·6–2 times as long as wide, obliquely triangular, acute; lowermost lobes 0·76–0·9 mm wide, 3–3·5 times as long as wide. Nutlets subcircular or ovate-circular, 0·8–1 mm long, 0·75–0·95 mm wide.—Figs. 2J, 3A, 5F, 6, 7, 31.

QUEENSLAND.—COOK DISTRICT: Cape Sidmouth, *Curdie* ? 101; Mt. Spider, near Mareeba, Apr. 1961, *Goodall, n.s.* (Oct. 1962, *Blake* 21955). NORTH KENNEDY DISTRICT: Stoney Creek, Dec. 1862, *Dallachy*. PORT CURTIS DISTRICT: Middle Percy Island, Mar. 1906, *Tryon*; South Percy Island, Mar. 1906, *Tryon*; (Sandy Cape and) Port Bowen, in 1842, *MacGillivray* 54; Port Clinton, Aug. 1802, *R. Brown*; Rockhampton, *Dietrich* 781, Apr. 1867, *O'Shanesy* 92; Jim Crow Mtn., Apr. 1963, *McKee* 10273. BURNETT DISTRICT: Top of Mt. Brian, Nov. 1960, *Schoneveld* 323. WIDE BAY DISTRICT: Mt. Tinbeerwah, *McArthur n.s.* (Caloundra, Dec. 1963, *McArthur*), *McKenzie n.s.* (Brisbane, Aug. 1959, *McKenzie*); Mt. Cooroy, Sept. 1961, *L. S. Smith* 11408A. MORETON DISTRICT: Mooloolah, Feb. 1914, *Maddock*; Blackall Range, Nov. 1916, *White*; Landsborough–Caloundra, July 1909, *Lucas*; Mt. Beerwah, Sept. 1957, *D. McGillivray* 287; Mt. Crookneck, May 1935, *Goy*; Mt. Ngungun, May 1930, *Hubbard* 2819, June 1951, *L. A. S. Johnson*, Mar. 1960, *Blake* 21215 (Dec. 1961, *Blake* 21648, 21650, Oct. 1962, *Blake* 21963, 21964); top of Glass House Mtns., July 1879, *Bailey;* Byron Creek near Diana's Bath, Jan. 1956, *Everist;* Dayboro, Jan. 1931, *Blake* 2105; SW. of Gatton, June 1963, *Taylor;* Mt. Edwards, Mar. 1934, *Everist* 548; Mt. Cordeaux, Oct. 1959, *Thorne*, ± 1020 m, Apr. 1961, *Blake* 21469, ± 1080 m, May 1961, *L. S. Smith* 11305; Cunningham's Gap, *F. M. Bailey*, Mar. 1956, *Trapnell*, June 1957, *Blake* 20127; Mt. Mitchell, in 1961, *Clifford, n.s.* (Feb. 1962, *Blake* 21672); Wilson Peak, *Peberty n.s.* (Brisbane, Oct. 1958, *Peberty*); Mt. Greville, 300 m, Apr. 1962, *Blake* 21702; Moogerah, Apr. 1962, *Blake* 21711; Ivory Rock,

S. of Ipswich, June 1962, *Blake n.s.* (Apr. 1963, *Blake* 22034); Brisbane R., *Dietrich*; Tamborine Mtn., Mar. 1910, *Domin* 8191, 8193; Mt. Lindesay, ± 1200 m, June 1935, *Everist* 1149; Mt. Lindesay, Oct. 1963, *Salmon;* Logan R., foot of Mt. Lindesay, Oct. 1963, *Salmon;* McPherson Range, Jan. 1919, *White;* McPherson Range, Razorback Range, *Gresty n.s.*, (Brisbane, Oct. 1960, *Gresty*); Mt. Roberts (McPherson Range), May 1955, *Blake* 19805 (Dec. 1961, *Blake* 21649, Nov. 1962, *Blake* 21972), Apr. 1958, *Blake* 20350; McPherson Range, Wagawn Lookout, Aug. 1959, *Blake n.s.* (Apr. 1960, *Blake* 21231). DARLING DOWNS DISTRICT: Bunya Mts., Oct. 1919, *White;* Bunya Mts., Picnic Plains, May 1961, *L. S. Smith* 11368; Condamine R., in 1873, *Hartmann;* Toowoomba, May 1910, *Vogan*, Apr. 1926, *Darnell-Smith;* Mt. Mitchell, NW. slopes, ± 900 m, Mar. 1960, *Parsons*, May 1961, *L. S. Smith* 11303; near Killarney, Oct. 1958, *Gresty*, Dec. 1961, *Morrow* 50A, 50B; Dalveen, Feb. 1963, *Pedley* 1211; Severn R., in 1873, *Hartmann* 56.

NEW SOUTH WALES.—NORTHERN TABLELANDS: Northern boundary of New England, *Lau;* Mt. Lindesay, Aug. 1916, *Boorman;* North Torrington, Jan. 1911, Boorman; Moona River, Walcha, Dec. 1884, *Crawford* 220. NORTH COAST: Mt. Nullum, Feb. 1899, *Goldsmid;* Whian Whian State Forest, N. of Lismore, *W. T. Jones n.s.* (Nov. 1958, *Blake* 20484); Gibbergunyah Mtn., N. of Lismore, Oct. 1963, *W. T. Jones;* Dorrigo, Jan. 1918, *Cleland;* Eastern Dorrigo, Oct. 1918, *Laurence* 11; Coramba Mtn., Apr. 1957, *C. L. Wilson* 582; Bellinger River, May 1916, *Swain;* Macleay R., *Beckler;* George's Creek near Kempsey, Jan. 1907, *Boorman;* Hastings River, *Beckler;* Crescent Head near Kempsey, Aug. 1908, *Stopford* 190; about 17 miles NNE. of Wauchope, 375 m, Oct. 1956, *Constable in NSW.* 41800; Ellenborough Falls, *Maiden & Boorman;* Kendall, Sept. 1929, *F. M. Bailey Jr.* 12; Wingham, June 1915, *Boorman;* Gloucester Buckets, Sept. 1897, *Maiden;* Alum Mtn., Bulahdelah, Oct. 1924, *Rupp in Hb. Rodway* 6875; West Wallsend, Oct. 1901, *Cambage;* Mt. Eliza, Oct. 1804, *R. Brown.* CENTRAL TABLELANDS: Mittagong to Bullio, Nov. 1919, *Cheel;* Wombeyan, Sept. 1928, *Morris* 2230. SOUTH COAST: Nowra Creek, Dec. 1916, *Rodway* 6867.

LORD HOWE ISLAND.—Apr. 1898, *Maiden.*

P. graveolens is chiefly a plant of exposed rock ledges and crevices (Fig. 5F). There is much variation in the abundance of long spreading hairs on the stem; some plants have very few such hairs. Leaves vary from cordate to cuneate on the same plant at different times, and cordate leaves may become cuneate on drying. Leaves with less than 11 teeth on each side are sometimes found.

Although treated as conspecific with *P. parviflorus* by Bentham in Fl. Aust. 5: 78 and most later writers or as a variety of this species by others, it is well distinguished by the more shrubby habit, absence of a tuberous base, greater number of leaf-teeth, abundance of gland-tipped hairs on stem and leaves, relatively shorter calyx, and the corolla-tube ± sharply bent often almost at a right angle. The whole plant is somewhat clammy to the touch and emits a heavy odour when bruised.

P. graveolens was first described by Brown in his MS. from specimens he collected at " Port II " (now Port Clinton), Queensland but he later collected specimens on the rocky slopes of Mt. Eliza near Paterson River, New South Wales. Both collections are covered by the reference " (J.T.) *v.v.*" in the published account. Material from both collections are mounted on one sheet (BM, photo BRI, Fig. 7) and Stearn has marked the former as lectotype.

In his MS. account R. Brown cited as a synonym *Ocimum foetidum* Sol. MS. which is *P. foetidus* Benth. The more hairy plants of *P. graveolens* have a superficial resemblance to some states of *P. foetidus* but the hairs are not so long with fewer cells, and the shape of the calyx lobes and corolla is different.

P. australis R. Br. var. *graveolens* (R. Br.) Domin forma *eximius* Domin was based on a specimen of *P. congestus* R. Br. (see under this species).

The specimen from Lord Howe Island was referred to *P. parviflorus* Willd. by Maiden, Proc. Linn. Soc. N.S.W. 23: 132 (1898); Maiden's citation was copied by W. R. B. Oliver, Trans. N.Z. Inst. 49: 150 (1917). Goldsmid's specimen from Mt. Nullum was referred to *P. congestus* by Maiden & Betche in Proc. Linn. Soc. N.S.W. 24: 149 (1899).

2. Plectranthus diversus S. T. Blake, species nova, affinis *P. graveolenti* R. Br. et *P. miro* S. T. Blake inter eos fere interstans, ab hic calycis lobis latioribus ab illo calycis labio supero angustiore minus obtuso, calyce sub anthesi majore, pilis caulinis quoad directione variabilibus, ab ambobus calyce fructifero arrecto minus accrescente ejus labio supero quam lobis lateralibus longiore distinguendus. Typus: E planta prope Bowen in Queensland a Jones lecta in Brisbane culta, *Blake* 22128 (BRI.049100); isotypi distribuendi.

Frutex fragrantissimus ± metralis corollis exceptis pilis glandulosis dense indutus. Caules polynodes internodiis brevibus cum pilis glandulosis pilos longiusculos retrorsos antrorsosve atque glandulas raras gerentes nodis serie pilorum longiorum patulorum vel leviter antrorsorum induti. Folia crassa saepe brevissime petiolata petiolis pro more $\frac{1}{6}$–$\frac{1}{2}$ laminae aequantibus; laminae ovatae vel late ovatae tum ± triangulares, acutae, basi rotundatae vel subtruncatae vel leviter cuneatae, dentium paribus 7–16 vel crenatae vel crenulatae vel crenato-serratae, utrinque villosae vel dense pubescentes atque pilis glandulosis plurimis usque ad 0·6 mm longis praeditae, subtus dense usque sparsissime glanduliferae, 2·8–8 cm longae, 1·7–6·5 cm latae; pili longiores subtus patulae vel ± retrorsae vel praecipue ei venis siti hic inde antrorsi. Racemi 1–5 (breviter pedunculati), 4–30 cm longi; axis perdense glanduloso-hirtellus atque pilis longioribus patulis vel ± antrorsis vel ± retrorsis eglandulosis atque glandulis sessilibus hic inde praeditus; bracteae magnae, late ovatae vel late trullato-ovatae usque anguste ovatae, basi ± attenuatae, 2·5–4·7 mm longae, mox caducae; verticillastri 10–20-flori, circa 5–12 mm distantes; pedicelli 1·5–4·5 mm longi, dense glanduloso-hirtelli. Flores violacei. Calyx 2·3–3·3 mm longus. Corolla 9–15 mm longa, lobis ± hirtella pilis nonnullis glandulosis atque ± glandulosa; tubus prope medium (sub medio) ad angulum pro more 90°–120° abrupte defractus, os versus vix dilatatus; lobi superiores subcirculares, laterales oblique subrotundi; labium inferum tubo brevius usque longius. Calyx fructifer 3·3–4·5 mm longus, adscendens vel ± arrectus, prope ad medium fissus glandulosus glanduloso-hirtellusque quoque rigide pubescens; labium superum ovatum vel late ovatum, acutum leviter acuminatum; lobi laterales breviores triangulares acuti leviter falcatae, ± duplo longiores quam lati; lobi inferiores labio supero paullo breviores usque distincte longiores, anguste triangulares, acuti, incurvi, duplo et semi usque quater longiores quam latiores. Nuculae saturate brunneae vel nigrae, lucidae, vel late ellipticae vel late elliptico-ovatae usque fere circulares, 0·8–0·9 mm longae 0·7–0·8 mm latae.—Figg. 2K, 3B, 8, 32.

Shrub with a powerful sweetish scent, up to 1·2 m high; stems stout, ± erect, up to 15 mm thick, many-noded with short internodes, densely glandular-pubescent with divaricate hairs 0·05–0·15 mm long, with many or few non-glandular hairs ± antrorse to ± retrorse on the internodes, the shorter 0·2–0·25 mm long, the longer, if present up to 7-celled and 1·2 mm long, more numerous, longer (up to 2·3 mm long with 5–8 cells) and divaricate to upcurved at the nodes, and sometimes with a few sessile glands. Leaves sometimes shortly to very shortly petiolate, the upper ones not much smaller and not more scattered, dull green or light green, paler beneath, the veins much impressed above and prominent beneath; petioles mostly $\frac{1}{6}$–$\frac{1}{2}$ as long as the blade, mostly 10–30 mm long; blade ovate to very broadly ovate and then sometimes ± triangular, broadly acute to subobtuse, subtruncate to rounded or somewhat cuneate at the base, crenate, crenulate or crenate-serrate with 7–16 pairs

of short teeth, copiously to very sparsely glandular beneath with orange-coloured (rarely colourless) glands, both sides villous or densely pubescent and with abundant shorter glandular hairs, the longer hairs divaricate to ± retrorse on the veins beneath or some also slightly antrorse on the midrib, the gland-tipped hairs up to 0·6 mm long more abundant on the ridge of the midrib and major veins (lower surface), about 2·8–8 cm long and 1·7–6·5 cm wide, 1–1·7 times as long as wide. Racemes 1–5, shortly pedunculate, 4–30 cm long; axis very densely glandular-hirtellous with occasional ± retrorse or antrorse longer non-glandular hairs and sometimes with occasional orange glands. Bracts early caducous, broadly ovate or broadly trullate-ovate to ± narrowly ovate, ± acute to obtuse, ± attenuate at base, glandular, densely glandular-hairy and with some longer non-glandular hairs especially at the margins, ± hairy inside, 2·5–4·7 mm long, 1·7–2·5 mm wide, from twice as long as wide to slightly wider than long; verticillasters 10–20-flowered, 5–12 mm apart, the branches of the cymes up to 1 mm long; pedicels 1·5–4·5 mm long, densely glandular-hirtellous. Flowers violet, the lower lip distinctly paler. Calyx 2·3–3·3 mm long, hirsute-pubescent with slightly antrorse hairs, also densely to sparsely glandular-hirtellous and densely to sparsely glandular, or the glands absent or colourless, the upper lobe reaching to the second bend in the corolla tube, the lower lobes reaching or more often exceeding the bend. Corolla 9–15 mm long, glabrous or nearly so on the tube, hirtellous with some of the hairs gland-tipped and also ± glandular on the lobes or the lateral lobes sparsely so with the hairs and glands tending to disappear from one or both of them, sometimes the lower lip ± eglandular; tube sharply bent a little below the middle at an angle of mostly 90°–120°, the part above the bend sometimes broader, not evidently widened towards the mouth; upper lobes about 2·5 mm diam.; laterals directed slightly outward and forward, somewhat obliquely rounded, about 0·7–1·0 mm wide and 0·6–0·8 mm high, sometimes unequal; lower lip slightly shorter to distinctly longer than the tube, 2·3–3·6 mm deep. Fruiting calyx 3·3–4·5 mm long, not much enlarged, ± upturned, lobed to about the middle, densely to sparsely glandular with the glands sometimes colourless, glandular-hirtellous and also rigidly pubescent or hirtellous; upper lip longer than the lateral lobes, ovate to broadly ovate, acute and somewhat acuminate, 1·1–2 mm wide; lateral lobes shorter, triangular, acute, slightly falcate, 0·8–1 mm wide, 1·4–2·2 times as long as wide; lower lobes from a little shorter to distinctly longer than the upper lip, narrowly triangular acute, 0·6–0·8 mm wide, 2·2–4 times as long as wide. Nutlets very dark brown to black, shining, broadly elliptic-ovate or broadly elliptic to subcircular, 0·8–0·9 mm long, 0·7–0·8 mm wide.—Figs. 2K, 3B, 8, 32.

QUEENSLAND.—COOK DISTRICT: Lizard I., Aug. 1848, *MacGillivray*, Sept.–Oct. 1967, *Heatwole* 75; Trinity B., in 1881, *Karsten;* Cape False, Jan. 1910, *Domin* 8189; top of Mt. Spider near Mareeba, Apr. 1961, *Goodall n.s.* (Oct. 1962, *Blake* 21954, Oct. 1963, *Blake* 22129, Oct. 1967, *Blake* 22845, Sept. 1969, *Blake* 23098). NORTH KENNEDY DISTRICT: Millstream Falls, 780 m, Aug. 1963, *Blake* 22100 (Aug. 1970, *Blake* 23553), July 1961, *Salmon* (Oct. 1961, *Blake* 21631, Nov. 1962, *Blake* 21973, July 1963, *Blake* 22054); Stony Creek [W. of Ingham], Dec. 1862, *Dallachy;* in 1876, *Johnson*, in 1882, *Bertheaud;* Magnetic I., Oct. 1961, *Simmonds* (Oct. 1962, *Blake* 21953); Townsville, top of Castle Hill, Apr. 1963, *R. Jones*; Calcium, S. of Townsville, Jan. 1966, *Birch* B66/22; Allingham Ck., *Daintree;* Basalt Wall, Fletcher Creek, *Daintree;* Dividing Range between the Flinders and the Burdekin, coll.?; Ravenswood in 1879, *Johnson;* near (W. of) Bowen, May 1960, *W. T. Jones n.s.* (Jan. 1961, *Blake* 21445, Jan. 1963, *Blake* 22088, Oct. 1963, *Blake* 22128) July 1963, *W. T. Jones*, July 1962, *Trapnell n.s.* (Nov. 1962, *Blake* 21976, Feb. 1964, *Blake* 22144), Aug. 1963,

Blake 22069 (Nov. 1969, *Blake* 23125, Nov. 1970 *Blake* 23569); Hayman I., June 1934, *White* 10169; Whitsunday I., *Henne*. SOUTH KENNEDY DISTRICT: S. of Bloomsbury near Mt. Macartney, Sept. 1963, *Howcroft*. LEICHHARDT DISTRICT: Kerlong Range, 25 miles SSW. of Nebo, Sept. 1961, *Lazarides & Story* 85; Rockland Spring, 24 miles S. of Blackwater, Sept. 1962, *Story & Yapp* 243.

P. diversus has been collected from granite, basalt, limestone and other rocks. It is closely similar to *P. graveolens* R. Br. and like this species it is very densely glandular-hairy, emits a strong though much sweeter odour when handled and the branches of the cymes of the verticillasters are often quite evidently distinct. The longer hairs are however partly antrorse or uncertain in direction. The calyx in flower is larger than is usual in *P. graveolens*, usually smaller in fruit so that the degree of enlargement is much less, and in this state the upper lobe is narrower.

The odour and general appearance are much like those of *P. mirus* S. T. Blake but the latter is almost or quite devoid of sessile glands and the declinate fruiting calyx is larger with much narrower lobes, especially the lateral and lower ones.

P. diversus is the only species so far seen with such variable direction of the longer hairs, and the erect fruiting calyx is an uncommon character found also in *P. foetidus* and *P. spectabilis*. Sessile glands are frequently sparse and sometimes colourless and then they may be overlooked; some of the gland-tipped hairs especially on the calyx have a very short lower cell and may be mistaken for colourless sessile glands but the upper cell is obovoid and not septate. Karsten's collection and Goodall's plants have thicker leaves with mostly more numerous teeth and shorter petioles than usual on other plants. After growing in a rock wall in my garden for over nine years one of Goodall's plants still has these features and in addition the corolla-tube is usually bent at about 90° or even less, while on plants from other localities the angle is usually greater. Goodall collected characteristic *P. graveolens* as well as *P. congestus* at the same locality.

3. Plectranthus mirus S. T. Blake, species nova, ob glandulas sessiles nullas vel fere nullas insignis, aliter *P. graveolentem* R. Br. et *P. foetidum* Benth. approximat et quoad forma loborum calycis inter eos fere interstans, sed ab hoc pilis eglandulosis brevioribus laxioribus, dentibus foliorum paucioribus racemis laxioribus, atque ab illo petiolis pro ratione brevibus, ab ambobus verticillastris saepius multifloris, calyce majore corollae tubo grosse abrupteque deflexo differt. Typus: White Cliff Point in Queensland, *Blake* 21791 (BRI. 100701–2); isotypi distribuendi.

Frutex fragrantissimus usque ad 1·5 m altus fere undique denissime glanduloso-pubescens atque densius vel sparsim pubescens pilis brevibus longioribusque patentibus vel retrorsis (facie superiore foliorum excepta) vel longioribus partim antrorsis sed glandulas sessiles omnino vel fere omnino carens. Folia ovata usque latissime ovata, acuta, basi vel latissime rotundata vel subtruncata vel leviter cordata, dentium paribus (7–) 10–15 crenato-serrata, 3–7·5 cm longa, 2·8–6·5 cm lata usque fere sesquies longiora quam latiora; petioli $\frac{1}{6}$–$\frac{2}{5}$ laminae adaequantes. Racemi 1–3, circa 10–20 cm longi, laxiusculi; verticillastri 10–20-flori pro more 8–20 mm distantes eorum ramuli saepe ± evoluti; bracteae late triangulari-ovatae vel trullatae usque anguste ovatae, acutae, 3·5–4·5 mm longae, mox caducae; pedicelli 1·5–6 mm longi, hirtelli. Flores ± violacei. Calyx 2·5–4 mm longus. Corolla 8–13·5 mm longa; tubus circa medium abrupte grosseque defractus angulum 80°–110° faciens os obliquum versus dilatatus parce hirtellus; lobi ± hirtelli etiam pilis glandulosis brevibus praediti; labium inferum tubum subaequans vel eo paullo longius breviusve. Calyx fructifer 4–6 mm longus ultra medium lobatus, parce pilosulus et parce glanduloso-pubescens, perraro glandulas sessiles perpaucas gerens; labium superius triangulari-ovatum, acutum et ± acuminatum; lobi laterales

anguste obliqueque triangulari-falcati, acuti, labio superiore paullo longiores, plus bis usque fere quater longiores quam latiores, 0·7–1·1 mm lati; lobi inferiores ceteris longiores peranguste triangulares, acuti, quater usque quinquies longiores quam latiores, 0·6–0·75 mm lati. Nuculi late vel fere latissime ovato-elliptici, 0·8–1·05 mm longi, 0·75–0·8 mm lati.—Figg. 2M, 3C, 5A, 9, 31.

Green, strongly somewhat sweetly scented, semi-succulent shrub up to 1·5 mm high with ascending or spreading stems at length woody below and there up to 10 mm thick, abundant gland-tipped hairs almost throughout, but no sessile glands. Stems densely to sparsely retrorsely to antrorsely pubescent with larger, up to 8-celled hairs mostly 0·5–1·8 mm long and short fine mostly retrorse hairs about 0·3–0·5 mm long together with abundant spreading gland-tipped hairs of varying length up to 0·25 mm long; no sessile glands. Leaves green, paler beneath; petioles $\frac{1}{6}$–$\frac{2}{5}$ as long as the blades; blades ovate to very broadly ovate, acute, subtruncately rounded to shallowly cordate, hardly at all decurrent on petiole, crenate-serrate nearly to the base with (7–) 10–15 pairs of broad somewhat triangular to ± rounded teeth, sometimes some of them with a secondary tooth, densely to sparsely pubescent and densely glandular-pubescent on both sides with the hairs on the veins beneath varying from retrorse to antrorse but without sessile glands even on the lower surface, 3–7·5 cm long, 2·8–6·5 cm wide, 1–1·4 times as long as wide. Racemes 1–3, about 10–20 cm long; axis pubescent and glandular-pubescent like the stem and without sessile glands; verticillasters 10–20-flowered, about (5–) 8–20 mm apart; bracts broadly triangular-ovate or somewhat trullate to narrowly ovate, acute, shortly contracted at base, pubescent and densely glandular-pubescent on both sides, about 3·5–4·5 mm long and 2·5–3·2 mm wide; branches of cymes commonly evident, the internodes up to 1 mm long; pedicels hirtellous with many of the hairs gland-tipped but without sessile glands, 1·5–6 mm long. Flowers rich violet. Calyx 2·5–4·0 mm long, closely shortly glandular-pubescent and also ± pilose, the hairs often extending to the inside of the lobes. Corolla 8–13·5 mm long; tube sharply bent about the middle at an angle of about 80°–110°, dilated towards the very oblique mouth, with a few hairs on the lower surface; all lobes ± hirtellous and especially the upper and lowermost with abundant small gland-tipped hairs but no sessile glands; upper lobes well separated about 1·8 mm diam.; lateral lobes slightly antrorse; lower lip shorter to longer than the tube. Stamens shortly exceeding the lower lip or ± included. Fruiting calyx (4–) 5–6 mm long, sparsely pilosulose and sparsely glandular-pubescent, the gland-tipped hairs extending inside the lobes, sometimes with a very few yellowish glands, lobed to well below the middle, tube about 1·3–1·6 mm wide; upper lip triangular-ovate acute and somewhat acuminate; lateral lobes narrowly obliquely triangular–falcate, acute, 1·9–3 mm long, 0·7–1·1 mm wide, 2·3–3·7 times as long as wide; lower lobes very narrowly triangular, acute, 2·7–3·6 mm long, 0·6–0·75 mm wide, 4–5 times as long as wide. Nutlets broadly or nearly very broadly ovate-elliptic, dark brown, 0·8–1·05 mm long, 0·75–8 mm wide.—Figs. 2M, 3C, 5A, 9, 31.

QUEENSLAND.—COOK DISTRICT: "Bustard Park" near Endeavour River (North Branch), N. of junction with Isabella Creek, June 1962, *Stephens;* White Cliff Point, about half-way between Mossman and Cairns, 10–25 m, May 1962, *Blake* 21791 (Nov. 1962, *Blake* 21980; Nov. 1963, *Blake* 22133); along Davies Creek Forestry Road, c. 10 miles ENE. of Mareeba, July 1962, *Hoogland* 8529; Gorge Creek, near Mareeba, Aug. 1962, *Clifford, n.s.* (Nov. 1962, *Blake* 21985, May 1963, *Blake* 22043); Gorge Creek, 480 m, Aug. 1963, *Blake* 22093 (Oct. 1967, *Blake* 22846, Nov. 1969, *Blake* 23124, Nov. 1970, *Blake* 23568); S. of Mareeba, 2 km W. of Rocky Creek, Sept. 1959, *Goodall.*

Very distinct because of the almost complete absence of sessile glands, the abundance of gland-tipped hairs of varying size, the many-flowered verticillasters with frequently distinct development of the cyme, often long pedicel, sharply and extensively bent corolla, deep lobing of the fruiting calyx with rather narrowly ovate upper lip and unusually narrow lateral lobes. It is the only Australian species consistently without abundant sessile glands even in the inflorescence (one or two were found on some calyces), the cymes are less reduced than usual in *Plectranthus*, and the calyx is more deeply cleft with narrower lateral lobes than in other Australian species. All collections are from granite outcrops, *Blake* 21791 being from an unusually white granite cliff running down to the sea. Stephens's specimens have much fewer and mostly short non-glandular hairs.

4. Plectranthus foetidus Benth. Lab. Gen. et Sp. 35 (1832). Type: Queensland, Endeavour R., *Banks & Solander* (holotype, BM, photo BRI; isotype, MEL, NSW, P, W).

Ocymum foetidum Banks ex Benth. loc. cit., pro syn.

Shrub 40–150 cm high with a ± pronounced ± foetid odour, the leaves and younger branches thick and fleshy. Stems up to nearly 2 m long, up to 25 mm thick at base, ± densely retrorsely white hirsute with hairs up to 2·3 mm long with up to 12 cells often intermixed with short divaricate gland-tipped hairs and sometimes a few sessile reddish 8-celled glands. Leaves with petioles mostly 0·5–3 cm long and $\frac{1}{10}$–$\frac{2}{5}$ as long as the blades, the uppermost 3–4 pairs becoming more remote, smaller and subsessile to sessile; blades mostly broadly to very broadly ovate or slightly wider than long, rarely merely ovate, acute and sometimes also shortly acuminate to ± obtuse, very broadly rounded to subtruncate or shallowly cordate, crenate-dentate nearly to the base with 12–30 rarely 34 pairs of short teeth becoming very small towards the base, commonly edged or tipped with purple, sometimes some with 1–2 secondary teeth, upper surface densely villous chiefly on the interveins and often with a few gland-tipped hairs but no sessile glands, lower surface densely white villous with divaricate to slightly retrorse hairs sometimes more or less concealing the many to few gland-tipped hairs except on the face of the larger veins and the many orange or yellowish sessile glands, mostly 2–10 cm long and 1·5–9·5 cm wide, mostly 1–1·3 times as long as wide, the veins and principal reticulations conspicuous because of the differential distribution of the indumentum. Racemes 1–3 or more, shortly pedunculate, 3–16 cm long, densely flowered, densely villous; axis hirsute and with many gland-tipped hairs but no sessile glands; bracts closely imbricate, very broadly ovate to trullate-ovate or narrowly trullate-ovate, acute or acutely acuminate, ± attenuate at base, villous outside and with sessile glands, more loosely pilose and eglandular within, the lower ones passing into the leaves, the others 6·5–2·5 mm long, 3·2–1·4 mm wide; verticillasters 6–11-flowered, about 5–10 mm apart, many of them contiguous; pedicels 0·5–1·5 mm long, with gland-tipped and eglandular hairs. Flowers intensely blue to violet. Calyx 2·5–4·5 mm long, densely villous, densely glandular to eglandular, without gland-tipped hairs. Corolla 7–11 mm long; tube glabrous or sparsely pilosulose on lower surface, eglandular, sharply bent near the middle at an angle of 105°–140°, scarcely widened towards the mouth; all lobes with

sessile glands and loosely pilose or the lateral ones glabrous; lower lip from shorter to somewhat longer than the tube. Fruiting calyx loosely villous, 4–5·5 mm long, lobed to $\frac{1}{2}$–$\frac{3}{5}$ its length, upper lip narrowly ovate, acute and acuminate; lateral lobes narrowly falcate-triangular, setaceously acute, about as long as or longer than the upper lip, 2·6–3·2 mm long, 0·7–0·9 mm wide, 3–4 times as long as wide; lower lobes narrowly triangular tapering to a softly setaceous point, 3·1–3·5 mm long, 0·6–0·8 mm wide, 4–5 times as long as wide. Nutlets brown to black, shining, subcircular or circular-ovate, 0·7–0·85 mm long, 0·6–0·75 mm wide.—Figs. 2D, 3D, 5D–E, 10, 11, 33.

Queensland.—Cook District: Endeavour R., in 1770, *Banks & Solander;* Mt. Finnigan, 600 m, Sept. 1948, *Brass* 19996; near (E. of) Mt. Molloy, head of Sandy Creek, July 1962, *Trapnell* B. 104 *n.s.* (Nov. 1962, *Blake* 21970, July 1963, *Blake* 22055, Sept. 1963, *Blake* 22123); Barron Falls and Stoney Creek Falls, in 1886, *Sayer;* Barron Falls in 1918, *Michael* 614; side of Barron Gorge near Barron Falls, 225–295 m, May 1962, *Blake* 21750 (Nov. 1962, *Blake* 21978, May 1963, *Blake* 22044, Sept. 1963, *Blake* 22124, Sept. 1970, *Blake* 23554); Stoney Creek, June 1934, *Flecker;* near Stoney Creek Falls, 200 m, May 1962, *Blake* 21733; Kamerunga, June 1892, *Bailey*?; Edge Hill, Cairns 6–10 m, May 1962, *Blake* 21790 (Oct. 1962, *Blake* 21960).

A robust, densely hairy, thick-leaved shrub found on the sides of cliffs or on steep rock slopes (Fig. 5D) with intensely violet to blue corollas that make a strong contrast with the dense white (sometimes purple) hairs of axis, bracts and calyxes. The leaves are commonly edged with purple on the teeth. The uppermost 3–4 pairs of leaves become more distant, markedly smaller with short to very short petioles, and are often asymmetric; they pass gradually into the bracts. As the flowering season advances short raceme-bearing branches with 1–2 pairs of small leaves grow out from the axils of the upper leaves; later these leaves fall and the greater part of each stem at length may resemble a large panicle of racemes. In his MS. account Solander stated that the species had a very strong foetid odour. Trapnell's plants from near Mt. Molloy (*Blake* 21970, 22055, 22123) have such an odour, but the other plants I handled had very little smell.

Gland-tipped hairs are unusually variable in development in this species, even on the same plant. The specimens collected by Banks and Solander at first sight appear to have an abundance of such hairs with relatively few long hairs but closer examination shows that most of the hairs are degenerated long hairs. *Blake* 21750 and the plants derived from this have hardly any gland-tipped hairs on the stems but extraordinarily long and abundant non-glandular hairs up to 2·3 mm long (not exceeding 1·8 mm in the collections from other localities). Gland-tipped hairs may be rare on the leaf but they are usually easily found towards the base on the lower surface. The calyx is also quite variable in length, some of those on *Blake* 22123 being about as long as the corolla-tube and up to 4·5 mm long although others from the same plant are only 2·7 mm long. Some leaves from plants growing in enriched soil (*Blake* 22055) are unusually large, as much as 15 × 12·5 cm.

As is evident from his manuscript, R. Brown regarded the specimens collected by Banks and Solander as conspecific with *P. graveolens*. *P. foetidus* superficially somewhat resembles some of the more hairy states of *P. graveolens*, but the petioles are relatively shorter, the inflorescence is denser with much shorter pedicels, and the calyx-teeth are unusually narrow. The species was omitted, apparently accidentally,

from Flora Australiensis. *P. spectabilis* has a dense inflorescence and a similar calyx and material of this species was referred to *P. foetidus* by F. Mueller and J. D. Hooker (see under *P. spectabilis*).

5. Plectranthus amicorum S. T. Blake, species nova, quoad pili indumenti ramorum *P. argentatum*, quoad inflorescentia et structura floris *P. gratum* et *P. apreptum* revocat, sed quoad foliorum indumentum densum breve et corollae lobi omnes ciliolati inter species australasicas distincta. Typus: Tinaroo Range in Queensland, *Blake* 22094 (BRI.100721–2); isotypi distribuendi.

Frutex suaveolens usque ad 1·5 m altus. Caules ramulique pilis brevibus retrorsis appressis primo albis dein ferrugineis aeque denseque strigilloso-pubescentes sine pilis glandulosis, glandulas 8-cellulares etiam gerentes. Folia subaequalia breviuscule petiolata petiolis circa $\frac{1}{5}$–$\frac{2}{5}$ laminae adaequantibus; laminae crassae latissime ovatae usque ovatae pro more etiam ± deltatae usque ± trullatae, acutae vel late rotundatae, basi subtruncatae usque cuneatae, dentium paribus 7–13 ± aeque crenatae vel crenato-serratae, pilis usque 0·65 mm longis supra antrorsis subtus retrorsis utrinque villosae sine pilis glandulosis, utrinque glanduligerae, circiter 2·5–8 cm longae et 1·5–5 cm latae. Racemi singuli ± 5–12 cm longi; axis retrorsim pubescens etiam glandulas et pilos glandulosos saepe minimos (0·05–0·15 mm longos) gerens; bracteae late vel latissime ovatae, pubescentes atque glandulas et pilos glandulosos minimos gerentes, ± 1·7–3 mm longae atque 1·3–3 mm latae; verticillastri pro more 10-flori, 7–12 mm distantes; pedicelli 2–4 mm longi. Flores caerulei tubo pallidiores. Calyx 2–3 mm longus. Corolla 9–12 mm longa; tubus glaber vel fere glaber sub medio ad angulum 90°–120° defractus ore obliquus; lobi omnes ciliolati extus pubescentes, superiores subcirculares glanduligeri, laterales brevissimi subtruncati, infimus glandulifer tubo subbrevior usque paullo longior genitalia fere includens. Calyx fructifer 4–4·5 mm longus usque circa medium fissus; labium superum late vel latissime ovatum, acutum, breviter subacuminatum; lobi laterales paullo breviores, leviter oblique triangulares acuti, fere duplo longiores quam latiores, 1–1·2 mm lati; lobi inferiores anguste triangulares, acuti, labio supero subaequilongi ter vel fere ter longiores quam latiores, 0·7–0·9 mm lati. Nuculi nitidi, atri, ambitu latissime elliptici usque subcirculares, 0·85–1 mm longi, 0·75–0·9 mm lati.—Figg. 2G, 3E, 12, 33.

Sweetly scented shrub to about 1·5 m. Stems up to 10 mm thick at base, hoary when young then purplish and later pale brown, densely evenly shortly appressedly pubescent (± strigillose) with retrorse 3–5-celled hairs 0·15–0·3 mm long at first white finally ± ferruginous; gland-tipped hairs absent; few to many 8-celled reddish sessile glands. Leaves evenly distributed, hoary to sage green above, ± whitish beneath; petioles mostly $\frac{1}{5}$–$\frac{2}{5}$ as long as the blade; blades very broadly to somewhat narrowly ovate, mostly also ± deltate to ± trullate, subtriangular acute to broadly rounded, subtruncate to cuneate at the base, rather evenly crenate or crenate-serrate with 7–13 pairs of usually short and broad teeth (sometimes a few with a secondary tooth), both sides villous without gland-tipped hairs but with sessile reddish glands more abundant beneath, the hairs 3–5-celled, up to 0·65 mm long, antrorse on upper surface chiefly on the internerves, retrorse below, about 2·5–8 cm long and 1·5–5 cm wide, from as long as wide to 1·6 times as long as wide. Racemes solitary, pedunculate, ± 5–12 cm long; axis retrorsely pubescent, also with glands and gland-tipped hairs, the latter mostly minute (0·05–0·15 mm long); bracts broadly or very broadly ovate, acute and sometimes also slightly acuminate, sometimes shortly clawed, pubescent and with glands and minute gland-tipped hairs, glabrous inside except for a few small hairs near the tip, about 1·7–3 mm long and 1·3–3 mm wide; verticillasters mostly 10-flowered, 7–12 mm apart; pedicels

hirtellous, 2–4 mm long. Flowers blue with a paler tube. Calyx 2–3 mm long extending beyond the bend of the corolla-tube. Corolla 9–12 mm long; tube glabrous or with a very few tiny hairs on the lower side, sharply bent below the middle at an angle of 90°–120° (–130°); all lobes pubescent on the outside and ciliolate, the upper and lower with glands on the outside and with a few hairs inside; uppermost about 1·8–2·5 mm wide and about as long; lateral ones very short, subtruncate; lower lip from a little shorter to longer than the tube. Stamens and style about as long as the corolla. Fruiting calyx 4–4·5 mm long, sparsely and shortly rigidly pubescent and also with glands and minute gland-tipped hairs, divided to about the middle. Upper lip broadly to very broadly ovate, acute and shortly somewhat acuminate, 1·9–2·1 mm wide; lateral lobes a little shorter, somewhat obliquely triangular, acute, about $1\frac{3}{4}$–2 times as long as wide, 1·8–2·1 mm long, 1–1·2 mm wide; lower lobes narrowly triangular acute, about as long as the upper lip, about $2\frac{1}{2}$–3 times as long as wide, 2·3–2·5 mm long, 0·7–0·9 mm wide. Nutlets very broadly elliptic to nearly circular in outline, 0·85–1 mm long, 0·75–0·9 mm wide.—Figs. 2G, 3E, 12, 33.

QUEENSLAND.—COOK DISTRICT: Tinaroo Range between Tinaroo Falls and Danbulla, 660 m, Aug. 1963, *Blake* 22094 (Nov. 1963, *Blake* 22130, Sept. 1969, *Blake* 23099, Aug. 1970, *Blake* 23552), *Blake* 22095 (Nov. 1963, *Blake* 22131); Tinaroo Dam, Aug. 1959, *W. T. Jones*. NORTH KENNEDY DISTRICT: Tully Falls, 660 m, Aug. 1963, *Blake* 22110.

The dense, white, closely appressed indumentum on the stem of short retrorse hairs without gland-tipped hairs resembles that of *P. argentatus* and *P. alloplectus* from extreme southern Queensland and all three species have glands on both sides of the leaves; *P. amicorum* differs from the former in the fewer leaf-teeth, 8-celled glands and sharply bent corolla-tube and from the latter in the broader leaves, longer pedicels and petioles, shallower lower lip of the corolla and ± included stamens, and from both in its sweet smell, abundance of mostly minute gland-tipped hairs in the inflorescence, and somewhat narrower upper lip of the calyx. It resembles the northern *P. gratus* in many ways but differs sharply in the retrorse (not antrorse) indumentum and the unusually dense, short, appressed hairs on the stem. It differs from all species in having all corolla lobes ciliolate.

The epithet *amicorum* (" of the friends ") commemorates all those who have helped in this study, especially those who collected living material.

Blake 22095 was from a single plant that had less hoary leaves and deeper blue flowers than the several other neighbouring plants from which the many specimens constituting 22094 were collected.

6. Plectranthus argentatus S. T. Blake, species nova, ob indumentum argenteum pilis glandulosis carens, folia utrinque et ramos dense glandulosos, corollae tubum leviter tantum decurvum distincta. Typus: Mt. Roberts, prope McPherson Range in Queensland, *Blake* 19803 (BRI.100693–6); isotypi distribuendi.

Fruticulus usque metralis dense cano-pubescens fere ubique pilis argenteis atque glandulis 4-cellularibus permultis dense indutus. Rami ramulique retrorsum pubescentes sine pilis glandulosis. Folia siccitate utrinque cana suprema vix diversa; petioli circa $\frac{1}{4}$–$\frac{1}{2}$ laminae adaequans; laminae ovatae usque late ovatae vel anguste ovatae, vel acutae vel subacuminatae vel parum obtusae, usque prope basin dentium paribus pro more 11–23 aeque crenato-dentatae utrinque glandulas ferentes,

subtus plerumque ad venas retrorsum pubescentes pilis minutis glanduliferis paucis additis, plerumque 5–11·5 cm longae 3–6·5 cm latae. Racemi saepius 3-ni 12–30 cm longi; axis retrorsum breviter pubescens glandulas multas et pilos minimos glanduliferos paucos etiam gerens; bracteae ovatae acutae 2–3 mm longae haud glanduliferae; verticillastri plerumque 10-flori circa 6–12 mm distantes; pedicelli 2·5–4 mm longi. Flores pallide caerulei. Calyx 1·6–2·5 mm longus. Corolla 9–11 mm longa; tubus leviter decurvus; lobi superiores et infimus parce pubescentes. Calyx fructifer 4–4·5 mm longus; labium superum late vel latissime ovatum, acutum vel etiam breviter acuminatum; lobi laterales oblique triangulares acuti, summo subaequilongi, ± 1 mm lati, circiter sesquies usque duplo longiores quam latiores; inferiores admodum longiores, oblique angusteque triangulares, acutae, 0·7–0·8 mm lati, circiter ter usque quater longiores quam latiores, basi quam laterales haud plus connati. Nuculae nitidae suborbiculares, 0·75–0·95 mm longae, 0·7–0·85 mm latae.—Figg. 2F, 3F, 5B, 5C, 13, 33.

Spreading, ± hoary shrub up to 1 m high, the branches ascending from stems up to 13 mm thick, appressedly pubescent with recurved 3–5-celled silvery hairs up to 0·8 mm long and densely glandular with ± reddish 4-celled sessile glands. Leaves with a silvery sheen when young, dull light green, whitish beneath; petioles about $\frac{1}{5}$–$\frac{3}{5}$ as long as blade, 1·2–5 cm long; blades ovate to somewhat broadly ovate, acute to somewhat acuminate or ± obtuse, broadly or very broadly rounded at the base to ± cuneate, evenly crenate-dentate to near the base with (11–) 13–23 pairs of antrorse teeth; both sides glandular with 4-celled glands and ± appressedly pubescent, more densely so beneath where the hairs are mostly restricted to the veins, also with a few minute gland-tipped hairs, mostly 5–11·5 cm long, 3–5·5 cm wide, 1·4–2 times as long as wide. Racemes 12–30 cm long; axis with glands and a few minute glandular hairs; verticillasters 9–11-flowered, 6–12 mm apart; bracts ovate, acute, 2–3 mm long, 1·1–1·8 mm wide, not glandular; pedicels 2·5–4 mm long. Flowers predominantly bluish white, paler coloured than usual. Calyx 1·6–2·5 mm long. Corolla 9–11 mm long; tube slightly decurved only (nearly straight), shortly oblique at the mouth, glabrous; uppermost lobes and lower lip sparsely pubescent, the latter about as long as the tube. Fruiting calyx 4–4·5 mm long; upper lip broadly ovate, acute or shortly acuminate; lateral lobes obliquely triangular acute, about as long as the upper lip, 0·9–1·1 mm wide, about 1·5–2 times as long as wide, 1 mm wide; lower lobes about 0·7–0·9 mm longer, narrowly triangular acute, 2·2–2·7 mm long, 0·7–0·8 mm wide, about 3–4 times as long as wide. Nutlets nearly circular, 0·75–0·95 mm long, 0·7–0·85 mm wide.—Figs. 2F, 3F, 5B, 5C, 13, 33.

QUEENSLAND.—MORETON DISTRICT: Tamborine Mtn., Mar. 1910, *Domin* 8192, 8194; Upper Albert River, Apr. 1936, *White* 10372; McPherson Range, Lamington National Park at Orchid Bower, Aug. 1959, *Blake n.s.* (Feb. 1960, *Blake* 21194); Mt. Roberts (Beechmont Range off McPherson Range), May 1955, *Blake* 19803 (Feb. 1960, *Blake* 21195, Feb. 1962, *Blake* 21676, seedling of this, Feb. 1960, *Blake* 21196), May 1951, *L. A. S. Johnson* 33; Springbrook, Jan. 1916, *White*, in 1959, *Hockings* (Mar. 1962, *Blake* 21686 and at Springbrook, Apr. 1959, *Hockings*). DARLING DOWNS DISTRICT: Mt. Mitchell, NW. slopes, ± 900 m, Mar. 1960, *Parsons*.

P. argentatus is readily distinguished by its pale-coloured flowers with slender nearly straight corolla-tube and the silvery indumentum. It is the only Australian species with the sessile glands constantly 4-celled. The crushed plant has very little odour. It grows in less rocky places than many other species and does very well in cultivation (Figs. 5B, 5C). It is achieving some popularity as a foliage plant under the name of " Green Silver ".

Spontaneous garden hybrids with *P. parviflorus* and *P. spectabilis* are intermediate between the parents in habit with 4-, 6-, and 8-celled sessile glands. A wild hybrid with *P. graveolens* was found near its parents on Mt. Roberts in Nov. 1967 (*Blake* 22854); another with *P. parviflorus* was collected on Tamborine Mtn. by Longman in Feb. 1917 (K) and a plant resembling this hybrid was collected at Dorrigo, N.S.W. by Trapnell (*Trapnell* A162, *Blake* 21687 etc.) but *P. argentatus* has not been collected in this area (see discussion under *P. parviflorus*).

7. **Plectranthus alloplectus** S. T. Blake, species nova, quoad indumento *P. argentato* S. T. Blake similis sed a congeneribus australiensibus foliis brevipetiolatis pro ratione angustis (anguste ovatis) genitalibus corollam conspicue superantibus distinguenda. Typus: Mt. Greville in Queensland, *Blake* 21703 (BRI.100718–20); isotypi distribuendi.

Fruticulus inodorus usque ad 50 cm altus, indumento denso albido appresso indutus. Caules ramulique pilis albidis retrorsis appressis (2–) 3–5-cellularibus usque ad 0·35 mm longis dense pubescentes, sine pilis glandulosis sed glandulis sessilibus aurantiacis permultis induti. Folia breviter petiolata petiolis 2–10 (–20) mm longis $\frac{1}{10}$–$\frac{1}{5}$ ($-\frac{1}{3}$) laminae adaequantibus; laminae anguste ovatae, obtusae basi admodum cuneatae utrinque 9–17 dentibus brevibus latis rotundatis crenulatae, supra densiuscule subtus densius pubescentes sine pilis glandulosis, utrinque ± dense glanduligerae (2–) 3–6·5 (–7·5) cm longae, 1–3 (–3·8) cm latae. Racemi singuli vel terni, 6–25 cm longi; axis dense retrorsum pubescens, dense glanduliger sed pilis glandulosis perraris minimis vel nullis; verticillastri 6–13-flori, 12–20 mm distantes; bracteae ± persistentes latissime ovatae usque ovatae vel subcirculares, aliquot acuminatae; pedicelli 1–2·3 mm longi. Flores ± violaceae. Calyx 1·7–2·3 mm longus. Corolla 8–12 mm longa, sine pilis glandulosis ± pubescens, lobis omnibus (lateralibus interdum exceptis) glandulas gerens; tubus labio infero brevior, sursum dilatatus prope medium angulo 120°–140° declinatus, basi subtus leviter ventricosus; lobi superiores subcirculares, laterales rotundati; genitalia spatio 1·5–4·5 mm longo exserta. Calyx fructifer 3·5–4 mm longus; labium superum oblatum, late rotundatum, tubo fere aequilongum; lobi laterales triangulares leviter falcati, acuti sesquies usque bis longiores quam latiores, labio supero aequilongi; lobi inferiores admodum longiores, anguste triangulares, duplo usque ter longiores quam latiores, acuti, incurvi. Nuculae atrae, nitidae, circulares.—Figg. 2H, 3G, 14, 32.

Hoary scentless shrub with few erect to spreading or ascending, sparsely branched stems up to 70 cm long, up to 7 mm thick towards the base; stems and branches closely appressedly pubescent with reflexed, white, (2-) 3–5-celled hairs (0·05–) 0·1–0·35 mm long, with no gland-tipped hairs but with abundant orange 8-celled sessile glands. Leaves shortly petiolate, when living sage green above withering yellowish, hoary beneath, with veins much impressed above and much raised beneath, in the dry state ± hoary on both sides with the veins much less prominent; petioles $\frac{1}{10}$–$\frac{1}{5}$ ($-\frac{1}{3}$) as long as the blade, 2–10 (–20) mm long, closely retrorsely pubescent with sometimes on the upper surface, a few long loose ± divaricate hairs; blade narrowly ovate, obtuse or acutate with the terminal tooth obtuse, somewhat cuneate and scarcely at all decurrent at the base, crenulate above the lower $\frac{1}{6}$–$\frac{1}{5}$, often obscurely so, with (8–) 9–17 pairs of short and broad, divaricate to slightly ascending teeth, moderately densely pubescent above, more densely so beneath with ± appressed hairs, moderately densely glandular above, very densely so beneath, but without gland-tipped hairs, (2–) 3–6·5 (–7·5) cm long, 1–3 (–3·8) cm wide, (1·8–) 2–2·5 times as long as wide. Racemes 1–3, pedunculate, mostly 6–25 cm long; axis densely retrorsely pubescent and with abundant sessile glands but with no or very few and minute gland-tipped hairs; bracts more persistent than in most other species, ovate

to very broadly ovate and acute to subcircular and obtuse, somewhat acuminate, sometimes shortly attenuate at base, about 4·5–2 mm long and wide; verticillasters 6–13-flowered, mostly 10–20 mm apart; pedicels 1–3 mm long, densely pubescent, retrorsely so below to ± antrorsely so above, with an occasional tiny gland-tipped hair and sessile gland. Flowers predominantly violet blue. Calyx 1·7–2·3 mm long, antrorsely long pubescent and abundantly glandular without gland-tipped hairs. Corolla 8–12 mm long, retrorsely ± pubescent above the base sometimes excepting the lateral lobes, glandular on all lobes except sometimes one or both the lateral ones, without gland-tipped hairs; tube broadened upwards towards the slightly oblique mouth, bent at an angle of about 120°–140° shortly below the middle, the lowest segment slightly swollen on the lower surface; uppermost lobes subcircular; lateral lobes rounded; lower lip unusually large, distinctly longer than the tube by up to 1·4 mm; lower stamens and style exceeding the lower lip by about 1·5–4·5 mm. Fruiting calyx rigidly pubescent and glandular and with a few minute gland-tipped hairs, 3·5–4 mm long; upper lip oblate, broadly rounded, ± definitely but minutely apiculate, about as long as the tube; lateral lobes triangular, slightly falcate, acute, 1½–2 times as long as wide, 1·5–1·8 mm long, 0·95–1·15 mm wide, as long as the upper lip; lower lobes narrowly triangular acute, 1·7–2·4 mm long, 0·7–1 mm wide, about 2–3 times as long as wide. Nutlets subcircular or somewhat ovate, 0·85–1 mm long 0·8–0·95 mm wide.—Figs. 2H, 3G, 14, 32.

QUEENSLAND.—MORETON DISTRICT: Mt. French, June 1932, *E. J. Smith;* near Cunningham Gap, *Trapnell n.s.* (Brisbane Botanic Gardens, May 1959, *Blake* 20570); Mt. Edwards, Jan. 1964, *Everist;* Mt. Greville, Oct. 1961, *Everist* (Mar.–Apr. 1962, *Blake* 21693); Mt. Greville, ± 300 m, Apr. 1962, *Blake* 21703 (Jan. 1963, *Blake* 22010, May 1963, *Blake* 22046); Mt. Minto, May 1957, *Everist* 5859A; Mt. Maroon, Jan. 1962, *Everist* 7038 (Jan. 1963, *Trapnell*, and *Blake* 22011) and Apr. 1962, *Everist* 7092.

NEW SOUTH WALES.—NORTHERN TABLELANDS: Near Woodenbong, Dec. 1962, *Blake n.s.* (Apr. 1963, *Blake* 22040).

The close white indumentum, narrow shortly petiolate leaves, unusually persistent bracts, short pedicels, large lower lip of the corolla and well exserted stamens and/or style set this species apart from the other species. The indumentum and to some extent the general appearance of the plant resemble that of *P. argentatus*, but the unusually shortly petiolate leaves are narrower than those of any other species, the lower lip of the corolla is the largest and deepest of any of the Australian species and it alone has such prominently exserted genitalia. It is known only from the few neighbouring localities cited above on cliffs and steep ledges of trachyte, except that Trapnell's plant was found growing in a fallen staghorn (*Platycerium grande*).

8. Plectranthus suaveolens S. T. Blake, species nova, affinis *P. parvifloro* Willd., *P. intraterraneo* S. T. Blake et *P. graveolenti* R. Br. quoad habitus hos et illum quoad dentes foliorum hoc et illos interstans, sed quoad indumentum densiusculum argenteum, rami ± strigosi, glandulae sessiles saepissime vel hyalinae vel nullae ab omnibus differt. Typus: Queen Mary's Falls prope Killarney in Queensland a Gresty lecta in Brisbane culta, *Blake* 20506 (BRI.100725–7); isotypi distribuendi.

Suffrutex suaveolens laxus pilis argenteis brevibus dense etiamque pilis glandulosis indutus sine pilis longis, glandulis sessilibus fere vel omnino destitutus. Caules ascendentes usque ad 80 cm longi pilis retrorsis et pilis glandulosis divaricatis induti glandulis sessilibus fere semper carentes. Folia longius petiolata, petiolis $\frac{1}{5}$–$\frac{1}{2}$ laminae aequantibus; laminae ovatae vel late ovatae, obtuse rotundatae, basi subtruncatae usque latissime cuneatae, paribus dentium 5–10 crenato-dentatae, facie utraque densius villoso-pubescentes pilis nonnullis glandulosis additis propter venas venulasque conspicuas rugosae, pro more 3–7·5 cm longae et 2–6 cm latae. Racemi singuli vel terni, 5·5–35 cm longi; axis pilis retrorsis et pilis divaricatis glandulosis pubescens sine glandulis sessilibus; verticillastri 10–12-flori pro more 10–15 mm distantes; bracteae mox caducae subcirculares vel circulari-ovatae, 1·5–2·7 mm longae 1·5–2·5 mm latae; pedicelli 1·5–4 mm longi. Flores ± violaceae. Calyx 2·0–2·7 mm longus interdum glandulas perpaucas coloratas vel hyalinas gerens. Corolla 9–12 mm longa; tubus circa medium ad angulum 120°–130° deflexus sursum leniter dilatatus parce pubescens; lobi superiores et labium inferum parce pubescens pilis nonnullis glandulosis et glandulas sessiles paucas haud coloratas gerentes; labium inferum tubum fere adaequans. Calyx fructifer 4·5–5 mm longus; labium superum subcirculare, ± apiculatum; lobi laterales triangulari-falcati incurvi, acuti, circa bis longiores quam latiores 0·9–1 mm lati; lobi inferiores anguste triangulares acuti, quam laterales paullo longiores, quater vel fere quater longiores quam latiores, 0·6–0·75 mm lati. Nuculae atrae ovato-circulares 0·8–0·85 mm longae, 0·75–0·8 mm latae.—Figg. 2I, 3H, 15, 34.

Loosely branched, sweet-smelling undershrub with ± decumbent to suberect stems up to 80 cm long and 9 mm thick near the base, often rooting at the lower nodes. Branches densely pubescent with short white retrorse hairs up to 0·5 mm long and many spreading shorter gland-tipped hairs, but without long spreading hairs and with no or extremely few sessile glands. Leaves hoary, paler beneath; petioles $\frac{1}{5}$–$\frac{1}{2}$ as long as the blades; blades ovate or broadly ovate, obtusely rounded, subtruncate to very broadly cuneate at base, crenate-dentate with 5–10 teeth on each side (one or two of these sometimes with a secondary tooth) with broad sinuses between, both sides rather densely villous-pubescent with longish white hairs and some shorter gland-tipped ones especially on the upper surface, also with or without very occasional usually colourless sessile glands beneath, mostly 3–7·5 cm long, 2–6 cm wide, and 1–1·4 times as long as wide, the veins deeply impressed above and strongly raised beneath. Racemes 5·5–35 cm long; axis pubescent with recurved hairs and some gland-tipped spreading hairs but no sessile glands. Verticillasters 10–12-flowered, mostly 10–15 mm apart; bracts early deciduous, subcircular or circular-ovate, hirtellous outside, 1·5–2·7 mm long, 1·5–2·5 mm wide; pedicels densely hirtellous, some of the hairs shorter and gland-tipped, 1·5–4 mm long. Flowers 9–12 mm long, predominately blue to violet; calyx 2–2·7 mm long, the lower lobes extending to or beyond the bend in the corolla-tube, the sessile glands often colourless and few; corolla 9–12 mm long; tube bent at an angle of 120°–130°, slightly broadened upwards, nearly straight at the mouth, sparsely pubescent; uppermost lobes and lower lip sparsely pubescent, also with a few gland-tipped hairs and a few sessile yellowish to reddish or colourless glands. Fruiting calyx 4·5–5 mm long; upper lip subcircular, ± apiculate; lateral lobes falcate-triangular, acute, about twice as long as wide, 1·8–2·2 mm long, 0·9–1 mm wide; lowermost lobes narrowly triangular, acute, about 3·5–4·5 times as long as wide, 2·5–2·6 mm long, 0·6–0·75 mm wide. Nutlets subcircular 0·8–0·85 mm long, 0·75–0·85 mm wide.—Figs. 2I, 3H, 15, 34.

Queensland.—Darling Downs District: The Summit, Nov. 1959, *Blake n.s.* (Mar. 1960, *Blake* 21202); Queen Mary's Falls near Killarney, July 1958, *Blake* 20383, Nov. 1958, *Gresty n.s.*

(Apr. 1959, *Blake* 20506 and self-sown seedling of this, Mar. 1960, *Blake* 21203, Dec. 1961, *Blake* 21646), Dec. 1962, *Blake n.s.* (Apr. 1963, *Blake* 22032); Wyberba, ± 770 m, Dec. 1962 *Blake* 22000 (Apr. 1963, *Blake* 22031).

NEW SOUTH WALES.—NORTHERN TABLELANDS: Tooloom Falls, Jan. 1956, *Grey* 3799; Timbarra, *Stuart* 443, 305 p.p.; Gilbralter Ra., ENE. of Glen Innes, 1080 m, Apr. 1956, *Constable in NSW.* 37962 and May 1961, *Constable in NSW.* 56012.

Distinct from all other species except *P. mirus* by reason of the fewness or absence of sessile glands and the fact that when present they are often colourless. Except for the presence of glandular hairs the indumentum resembles that of *P. argentatus*, the toothing of the leaves is more like that of *P. parviflorus*, and the deeply impressed veins like *P. graveolens*, but the sweetish smell, large corollas with gland-tipped hairs, and the form of the corolla-tube are different from any.

9. Plectranthus klossii S. Moore, Trans. Linn. Soc. Bot. II, 9: 137 (1916). Type: West New Guinea, Utakwa River to Mt. Carstensz, *C. Boden Kloss* (BM, photos BRI; isotype, K).

Plectranthus klossii S. Moore var. *major* S. Moore, Trans. Linn. Soc. Bot. II, 9: 137 (1916). Type: West New Guinea, Utakwa River to Mt. Carstensz, *C. Boden Kloss* (BM, photo BRI).

Stems ascending or erect up to at least 60 cm high (Brass) with up to 15 (or more ?) nodes beneath the inflorescence, densely hirsute with long spreading many-celled hairs with up to 14 cells sometimes mixed with much shorter gland-tipped hairs up to 0.2 mm long, with or without some sessile reddish glands. Leaves paler beneath; petioles $\frac{1}{6}$–$\frac{1}{2}$ as long as the blade; blades somewhat narrowly ovate or triangular-ovate to broadly ovate or very broadly elliptic-ovate, obtuse to subacute, broadly cuneate to broadly rounded or subtruncate at the base, hardly at all decurrent to the petiole, mostly coarsely crenate-dentate, crenate or crenate-serrate except near the base with 4–15, mostly 5–11 pairs of ± rounded teeth, both sides hirsute with long several-celled hairs sometimes mixed with a few minute gland-tipped hairs, the indumentum on the lower surface ± confined to the veins and sometimes less dense than on the upper surface, glands sparse to absent on the upper surface, abundant beneath, all 4-celled, mostly 1–4·5 cm long and 0·6–3 cm wide, 1·1–1·8 (–2) times as long as wide. Racemes solitary or 2–3, simple, 6–18·5 cm long; axis laxly to densely pilose and with gland-tipped hairs but with very few or no sessile glands; bracts broadly ovate to circular-ovate, obtuse, ± 2·2–2·7 mm long; verticillasters 6–10-flowered, about 5–15 (–20) mm apart; pedicels 1·5–3·5 mm long, up to 4 mm long in fruit. Calyx 2·2–2·5 mm long. Corolla 8–11 mm long; tube decurved at an angle of 130°–160°, slightly widened towards the oblique mouth, glabrous or sparsely puberulous; uppermost lobes and lower lip sparsely pubescent and sparsely glandular, the latter shorter or longer than the tube; lateral lobes sometimes with a few hairs and sometimes with 1 or 2 glands. Genitalia about as long as the lower lip. Fruiting calyx 4–5·5 mm long; upper lobe about half as long as the calyx, circular-ovate, obtuse or very abruptly and very shortly acuminate; lateral lobes 0·7–1·2 mm wide, 2–2·5 times as long as wide, obliquely triangular, slightly falcate, narrowly obtuse or acute; lowermost lobes 0·7–0·95 mm wide, 2·6–3·3 times as long as wide. Nutlets subcircular, about 0·8–0·95 mm long, about 0·8–0·9 mm wide.—Figs. 2B–C, 3I, 16, 17 A–C, 36.

TIMOR.—CENTRAL PORTUGUESE TIMOR: Mt. Perdido, 800–1200 m, Dec. 1953, *van Steenis* 18243. SOUTH CENTRAL TIMOR: Bonleo, S. of Mt. Moetis, ± 1080 m, May 1929, *Walsh* 341; Oë Boeboek near Kapan, 825 m, Feb. 1929, *Walsh* 145; Nipol, ± 450 m, May 1929, *Walsh* 378; Soë, 780 m, Dec. 1928, *Walsh*.

NEW GUINEA.—WEST NEW GUINEA: Utakwa River to Mt. Carstensz, Camps 8–9, 1497–1762 m, *Boden Kloss*, and Camps 9–10, 1762–1965 m, *Boden Kloss;* Bele R., 18 km NE. of Lake Habbema, 2200 m camp, Nov. 1938, *Brass* 11555. NORTH-EAST NEW GUINEA: Wabag Area near Rumpipaga, 2250 m, Aug. 1960, *Robbins* 3280; Daulo Pass, 2400 m, June 1955, *Gressitt* 2304; Kassam, 1370 m, Nov. 1959, *Brass* 32362.

P. klossii resembles *P. argentatus* in having a weakly bent corolla-tube and 4-celled glands but the numerous leaves on the flowering stems give it a different aspect from the Australian species. On most specimens also the leaf-blades pass abruptly into the petioles. The types of *P. klossii* and *P. klossii* var. *major* are from small plants with small leaves, the blades on the former being only 7–13 mm long and up to 20 mm long on the latter. At the other extreme *Walsh* 378 has large thin leaves up to about 9 cm long more or less decurrent on the petiole with up to 14 pairs of teeth and the indumentum on the specimen is relatively sparse with very few long hairs; the aspect suggests that it came from a luxuriant plant growing in shade, but no details of the habitat are given on the label.

In Gard. Bull. Sing. 24: 150 (1969), Keng cited *van Steenis* 18243 and *Walsh* 378 under *P. parviflorus*.

10. Plectranthus intraterraneus S. T. Blake, species nova, affinis *P. parvifloro* Willd. et *P. graveolenti* R. Br., ab hic foliorum tenuiorum dentibus paucioribus et corollae tubo minus defracto ab illo habitu fruticoso et pilis ramorum foliorumque partim glandulosis, ab utraque calycis lobis lateralibus pro ratione latioribus praecipue differt. Typus: E planta ex Palm Valley in Australia centrali a Forde missa in Brisbane culta, *Blake* 20193 (BRI. 100700); isotypi distribuendi.

Frutex suaveolens usque metralis pilos glandulosos fere ubique gerens. Caules ramulique pilis brevibus glandulosis divaricatis et pilis longioribus recurvis dense pubescentes et glandulas rubidas gerentes, tandem glabrescentes. Folia longius petiolata petiolis $\frac{1}{4}$–$\frac{1}{2}$ laminae aequantibus; laminae ovatae usque latissime ovatae, obtusae vel ± acutae, basi late cuneatae usque subtruncatae, dentium paribus 4–6 (–8) saepe grosse crenatae vel dentato-crenatae, utrinque glanduligerae et dense usque parcius pubescentes pilis glandulosis multis additis, fere planae venulis obscuris, pro more 2–5 cm longae et 1·2–5 cm latae. Racemi saepius singuli, 10–20 cm longi; axis glanduliger et pilis glandulosis et pilis eglandulosis retrorsis saepius longioribus breviter pubescens; verticillastri 6 (–10)-flori circa 10–15 mm distantes; bracteae late ovatae vel circulari-ovatae, 1·2–1·6 mm longae, 1–1·6 mm latae, mox caducae; pedicelli 0·5–4·5 mm longi. Flores ± violaceae (asterini vel methylo-violacei). Calyx 2·4–2·7 mm longus. Corolla 8·5–13 mm longa; tubus circa medium ad angulum 110°–130° deflexus sursum gradatim latior, glaber, fere eglandulosus; lobi omnes glanduligeri superiores inferiorque pubescentes, superiores subcirculares, laterales oblique oblongo-ovati, inferior tubo subaequilongus. Genitalia corollae subaequantia. Calyx fructifer 4–5·5 mm longus; labium superum subcirculare admodum apiculatum tubo subaequilongum; lobi laterales paullo breviores, oblique triangulares, acuti, sesquies longiores quam latiores vel paullo breviores; lobi inferiores anguste triangulares, acuti, quam laterales longiores. Nuculae brunneae vel atrae, nitidae, subcirculares.—Figg. 2L, 4A, 18, 35.

Sweetly scented shrub up to 1 m high, stems and branches at length hard, 3·5–7 mm or more thick, densely pubescent with spreading glandular hairs and longer recurved mostly 4–5-celled trichomes ± 0·4–0·7 mm long and with reddish

glands, finally glabrous. Leaves light green, paler beneath; petioles about $\frac{1}{4}$–$\frac{1}{2}$ as long as the blade; blades very broadly ovate to ovate, obtuse to ± acute, broadly cuneate to subtruncate at base, crenate or dentate-crenate, sometimes deeply or coarsely so, with 4–6 (–8) pairs of teeth, densely to somewhat sparingly pubescent, the indumentum about equally dense on both sides but somewhat coarser on the upper side, many of the hairs glandular on both surfaces, both surfaces glandular the upper sparsely so, mostly 2–5 cm long and 1·2–5 cm wide, up to nearly twice as long as wide, reticulations obscure, not bullate. Racemes 10–20 cm long; axis with glands and glandular hairs; verticillasters 6 (–10)-flowered, about 10–15 (–20) mm apart; bracts broadly ovate to circular-ovate, pubescent and glandular, 1·2–1·6 mm long, 1–1·6 mm wide; pedicels 2·5–4·5 mm long. Flowers violet, chiefly the lighter tints. Calyx 2·4–2·7 mm long. Corolla 8·5–13 mm long; tube sharply bent below the middle at an angle of 110°–130°, widened upwards, glabrous and nearly eglandular; uppermost lobes pubescent and glandular on the back; lateral lobes sometimes sparsely glandular; lower lip about as long as the tube, glandular, sparsely pubescent, some of the hairs glandular. Fruiting calyx 4–5·5 mm long, lobed to about the middle; upper lip subcircular, somewhat apiculate; lateral lobes shorter, obliquely triangular, acute and acuminate, about 1·3–1·5 times as long as wide, 1·6–1·8 mm long, 1·25–1·3 mm wide; lowermost the longest, narrowly triangular, acute, 2·2–2·5 mm long, 0·8 mm wide. Nutlets subcircular, 0·9–1·15 mm long, 0·8–1·05 mm wide.—Figs. 2L, 4A, 18, 35.

WESTERN AUSTRALIA.—NORTHERN PROVINCE: Cape Range [near North West Cape], June 1961, *George* 2429; Hammersley Range, Wittenoom Gorge, in 1952, *McMahon*, and Dale's Gorge, Aug. 1960, *George* 1054.

NORTHERN TERRITORY.—ALICE SPRINGS DISTRICT: Bigilyie Waterhole, Vaughan Springs, Feb. 1955, *Chippendale in NT.* 6635; 10 miles NE. Haast's Bluff Settlement, June 1957, *Forde* 844; Haast's Bluff Reserve, Aug. 1956, *Cleland;* Reedy Ck., George Gill Range, Aug. 1957, *Chippendale in NT.* 3647; Mt. Sonder, *Tate* (?); Palm Valley, Aug. 1929, *Cleland*, July–Aug. 1953, *Caulfield & Hill*, July 1954, *Chippendale in NT.* 16, May 1957, *Forde* 746 *n.s.* (Jan.–Mar. 1958, *Blake* 20193, and self-sown Feb. 1959, *Blake* 20518), July 1958, *Lothian & Hill* 945; Reedy Ck. (Palm Ck.) in 1894, *Tate;* Standley Chasm Ck., July 1958, *Hill & Lothian* 969; Finke River in 1882, *Kempe* 432; James Range, Mar. 1885, *Kempe* 12; Mt. Olga in 1889, *Tietkins*, June 1926, *Basedow*, June 1956, *Forde* 161, June 1958, *Chippendale in NT.* 4667, July 1958, *Hill & Lothian* 770, Sept. 1965, *Everist* 7824; between Mt. Olga and Barrows Range (W.A.), *Giles;* " Central Australia," *Gosse* 33.

SOUTH AUSTRALIA.—FAR NORTH-WEST: Mt. Woodroffe, ± 1100 m, June 1958, *Hill & Lothian* 680; 8 miles N. of Ernabella, Musgrave Ranges, Aug. 1933, *Cleland;* Mitchell Knob, Musgrave Ranges, June 1958, *Hill & Lothian* 695; Everard Ranges, Aug. 1954, *Cleland*, Sept. 1957, *Forde* 908. FLINDERS RANGES: Gammon Ranges, gorge of Balcanoona Ck., Sept. 1956, *Eichler* 12912; summit of Mt. Chambers, May 1937, *Cleland;* Mambray Creek area, Nov. 1954, *R. G. Gray* (from Gray's seed, Oct. 1958, *Blake* 20483).

P. intraterraneus resembles *P. parviflorus* and *P. suaveolens* in the few teeth to the leaves and in the general structure of the flower. It differs from the former in the more shrubby habit, many gland-tipped hairs on the stems, leaves and corolla, glands on the stem, leaves about equally pubescent on both sides, less unequal pedicels, and sweeter odour of the plant; from the latter (which it resembles in odour) it differs in the more erect habit, looser indumentum, coloured sessile glands, and fewer leaf-teeth; and it differs from both in the much broader lateral lobes of the calyx, and the corolla-tube much more widened towards the mouth.

The extensive area of distribution is disjunct from that of other species, and receives a much lower rainfall.

11. Plectranthus parviflorus Willd. Hort. Berol. t. 65 (1806 *prius*): nec R. Br. (1810) nec Guerke (1898). Type: Plant cultivated in the Berlin Botanic Garden of unknown origin, Hb. Willdenow 11078 (B, photo BRI).

Plectranthus parviflorus Spreng. Gartenzeit. 3 (20): 155 (1805) *nomen invalidum.* Based on living plants cultivated in the Botanic Garden at Halle, Germany, supposedly of South American origin.

Plectranthus parviflorus Spreng. in Henckel, Adumb. Pl. Hal. 17 (1806). Based on living plants supposed to be of Peruvian origin cultivated at Halle of which no specimen has been preserved.

Plectranthus paniculatus Jacq. Fragm. Bot. 62, t. 91 (1807–9): non Baker (1900). Based on living plants cultivated in Vienna of unknown origin, from which was probably taken a specimen Hb. Trattinick (W, photo BRI).

Plectranthus sieberi Benth. Lab. Gen. et Sp. 710 (1835). Type: " In Nova Hollandia tropica Sieber " (K).

Plectranthus australis R. Br. Prodr. 506 (1810). Type (Lectotype): New South Wales, Port Jackson, 17 May, 1802, *R. Brown* (BM, photo BRI; iso, BRI, E, K).

Plectranthus parviflorus Willd. *β ? elatior* Benth. in DC. Prodr. 12: 67 (1848). Type: Northern Territory, Port Essington, *Armstrong* (K, photo BRI).

Plectranthus parviflorus " R. Br." var. *australis* (R. Br.) Briq. Natürl. Pfl.-fam. IV 3a: 357 (1895). Based on *P. australis.*

Plectranthus parviflorus Willd. var. *minor* F. M. Bail. Qd Agr. J. 28: 199, t. 41 (1912), *nomen.*

Plectranthus parviflorus Willd. var. *major* F. M. Bail. Qd Agr. J. 28: 199, t. 41 (1912), *nomen.*

Plectranthus australis R. Br. var. *vulgaris* Domin, Biblioth. Bot. 89: 564 (1928). Based on *P. australis.*

Plectranthus australis R. Br. var. *vulgaris* Domin forma *densiflorus* Domin, Biblioth. Bot. 89: 564 (1928) (" *densiflora* "). Type: Queensland, Tamborine Mtn., *Domin* (PR, photo BRI).

Germanea parviflora (Spreng. in Henckel) Poir. Encycl. Suppl. 2: 764 (1811). Based on *Plectranthus parviflorus* Spreng. in Henckel.

Germanea australis (R. Br.) Britten, Illustr. Bot. Capt. Cook's Voy. 2: 75 (1901). Based on *Plectranthus australis.*

Perennial herb mostly 10–70 cm high, rarely attaining 1 m, with a fleshy tuberous base up to 3 cm diameter that shrinks very much on drying, dying away after flowering nearly or quite to the tuber; stems simple or more usually branching from the base upwards sometimes repeatedly so, the branches ascending, the stems or branches

6–8-noded beneath the inflorescence, the upper internodes not markedly elongated, all variously puberulent or pubescent or sometimes hirsute usually with abundant short retrorse 2–3-celled hairs about 0·1–0·15 mm long and few to abundant longer spreading to retrorse 3–9-celled hairs up to 1·8 mm long, sometimes with a few minute gland-tipped hairs added and with few or no sessile glands below the inflorescence; leaves dull green or purplish, paler beneath; petioles $\frac{1}{3}$–$\frac{4}{5}$ as long as the blades; blades circular–ovate to ovate or oblong-ovate, obtuse to ± acute, broadly cuneate to subtruncate at the base, crenate or dentate-crenate, sometimes coarsely so, with 4–8 or rarely up to 12 pairs of teeth, sparingly to densely pubescent above and also occasionally sparsely glandular, often less pubescent on the densely glandular lower surface sometimes with a few usually minute glandular hairs added, mostly 2–6·5 cm long and 2–4 cm wide, from as long as wide to 1·5 rarely 2 times as long as wide, the veins not very conspicuous in the dry state. Racemes pedunculate, solitary or 2–5 with a common peduncle, mostly 3–15 cm long; axis pubescent with short glandular hairs and longer spreading hairs (the latter sometimes very rare) and also with sessile glands; bracts broadly ovate to subcircular or somewhat obovate, pubescent to ciliate, 1·3–2·5 mm long, 0·9–2 mm wide, early caducous; verticillasters (6–) 10-flowered, about 5–15 mm apart; pedicels 1–6 mm long, often conspicuously unequal, shortly pubescent, sometimes partly with gland-tipped hairs. Flowers predominantly violet blue, sometimes very pale, variable in size, sometimes minute and cleistogamous. Calyx 1·4–2·6 mm long, pubescent and usually also glandular. Corolla of chasmogamous flowers 6–11 mm long, ± glandular and pubescent on the upper lobes, slightly pubescent and sometimes glandular on the lower lip; tube decurved a little below the middle at an angle of 110°–140°, slightly gibbous above at the base, dilated above the middle, sometimes with a few hairs on the lower surface; lower lip about as long as the tube. Cleistogamous flowers with corolla scarcely if at all exceeding the calyx, 1·2–3·2 mm long with a slightly flexuose to nearly straight tube. Fruiting calyx (3·7–) 4–5 mm long; upper lip about half as long, very broadly ovate, somewhat apiculate or muticous; lateral lobes slightly shorter, obliquely triangular and very slightly falcate, acute, 1·4–2·5 mm long, 0·9–1·3 mm wide; lowermost slightly the longest, narrowly triangular acute, 1·8–3·2 mm long, 0·6–0·8 mm wide. Nutlets dark brown to black, shining, subcircular, 0·7–1 mm long, 0·7–0·9 mm wide.—Figs. 1H, 2E, 4B, 19–21, 35.

QUEENSLAND.—COOK DISTRICT: Near (about SW. of) Atherton, May 1960, *W. T. Jones* (Nov. 1960, *Blake* 21405); S. of Atherton, May 1963, *Lovelady;* Dinner Falls, Mt. Hypipamee, 910 m, Aug. 1963, *Blake n.s.* (Feb. 1964, *Blake* 22146); Boonjee in 1958, *W. T. Jones n.s.* (Jan. 1959, *Blake* 20503, Feb. 1959, *Blake* 20525, Jan. 1960, *Blake* 21193); Millaa Millaa Falls, Aug. 1963, *Blake* 22116; Robertson River, *Armit* 758; Gilbert River, *Mueller.* NORTH KENNEDY DISTRICT: Ravenshoe, 900 m, Jan. 1929, *Stephenson* 618; Ravenshoe, Apr. 1937, *Thurston* 124 *in NQNC.* 3208; Cleveland Bay, *Daintree.* MITCHELL DISTRICT: Bowen Downs in 1873, *Birch*; Enniskillen, Dec. 1941, *White* 11663; Tambo, March 1902, *Grove.* LEICHHARDT DISTRICT: About 9 miles E. of Emerald, Feb. 1960, *Johnson* 1351; 2 miles E. of Dingo, June 1960, *Johnson* 1988; " Pegunny North ", ± 30 miles W. of Moura, May 1962, *Johnson* 2285; 20 miles NW. of Theodore, Apr. 1963, *Johnson* 2633; Springsure, *Clement;* Mt. Faraday, July 1846, *Mitchell;* " Dyngie ", *Ross;* ± 25 miles S. of Rolleston, Feb. 1960, *Johnson* 1267; Taroom, Feb. 1959, *Johnson* 701; Carnarvon Ck. gorge, 70 miles W. of Injune, May 1962, *Johnson* 2401. PORT CURTIS DISTRICT: Broadsound Range, June 1960, *W. T. Jones* (Nov. 1960, *Blake* 21404, Jan. 1961, *Blake* 21448); Gracemere, June 1870, *O'Shanesy* 1222, Nov. 1870, *O'Shanesy* 1233; near Gracemere, *Bowman;* Neerkool Creek, *Bowman;* Gladstone,

Hedley; Bustard Bay, *Banks & Solander.* WIDE BAY DISTRICT: " New Moonta," Gin Gin, Oct. 1966, *G. Kleinschmidt*; Goondoon, Jan. 1970, *Lebler & Durrington* 5; Fraser I., Nov. 1930, *Hubbard* 4651; Boreen Point, Lake Cootharaba, Apr. 1954, *Blake* 19272. BURNETT DISTRICT: Mundubbera, Feb. 1922, *Sherrin;* Kingaroy, Apr. 1947, *Smith* 3095; Burnett River, *Haly;* near Coolabunia, Mar. 1956, *Everist.* MARANOA DISTRICT: 40 miles W. of St. George, *Holland & Gnauck* 534; between Roma and Carnarvon Range, Sept. 1954, *Wetherell n.s.* (Jan. 1957, *Blake* 20076). DARLING DOWNS DISTRICT: " Cypress Downs ", N. of Jackson, Mar. 1953, *Blake* 19159 (Jan. 1957, *Blake* 20075); Meandarra, Mar. 1960, *Coaldrake QB.* 95; Bell–Bunya Mtns. road, May 1958, *Johnson & Pedley* 458; Toowoomba in 1886, *Flood;* Warwick, coll.?; Yelarbon, Dec. 1934, *Everist* 905, Feb. 1936, *Blake* 10461, Feb. 1963, *Pedley* 1224, Apr. 1966, *McDonald & Gillieatt* 188; Queen Mary's Falls near Killarney, Dec. 1961, *Morrow* 49, Dec. 1962, *Blake* 21992; near Dalveen, Feb. 1963, *Pedley* 1210. MORETON DISTRICT: Yarraman, Mar. 1959, *Tracy in Thorne* 25421; Crow's Nest, Feb. 1922, *Kenny;* near (NE. of) Crow's Nest, Jan. 1970, *Blake* 23141; Mt. Peregian, June 1955, *Blake n.s.* (Jan. 1957, *Blake* 20077); Buderim Mtn., Apr. 1912, *White;* SW. of Gatton, June 1963, *Trapnell;* Mt. Greville, 240–300 m, Apr. 1962, *Blake* 21700; Moogerah, Apr. 1962, *Blake* 21712; Ivory Rock, S. of Ipswich, ± 210 m, June 1962, *Blake* 21888; Petrie, N. of Brisbane, Dec. 1931, *Blake* 3068; South Pine, Feb. 1882, *Statter;* Mt. Glorious, Jan. 1945, *Clemens;* The Gap, Brisbane, Oct. 1962, *Blake* 21950; Taylor Range, *Blake n.s.* (seedlings of this, Jan. 1957, *Blake* 20074, Nov. 1962, *Blake* 21969); Taylor Range, Feb. 1875, *F. M. Bailey;* Moreton Bay, Dec. 1856, *Mueller;* Brisbane River, *Stuart* 320, *Dietrich*, July 1855, *Mueller;* Breakfast Ck., *Stuart* 19; Brisbane Botanic Gardens, Feb. 1956, *Webb SN.* 5555; Pine Mtn. (Brisbane), Mar. 1907, *Field Naturalists' Club;* Moreton I., *Eaves;* Stradbroke I., between Amity Point and Point Lookout, Apr. 1930, *Hubbard* 2321; Point Lookout, Apr. 1935, *Goy;* Tamborine Mtn., May 1930, *Hubbard* 2452, Mar. 1910, *Domin* 8185, 8186, 8190, and Mar. 1947, *Clemens;* Southport in 1885, *Mrs. Spencer;* near Rocky Creek, foot of Mt. Barney, Dec. 1961, *Morrow* 51; Logan R., foot of Mt. Ernest, Oct. 1963, *Salmon;* Lindesay Ck., foot of Mt. Lindesay, Nov. 1946, *Everist & Webb* 1410; Buchanan's Fort, Apr. 1938, *Goy & Smith* 264; Cainbable, Nov. 1959, *Tracy;* McPherson Range, Easter 1909, *White;* Mt. Roberts (Beechmont Range), ± 750 m, May 1955, *Blake* 19804; Koongalala Point, (Beechmont Range), Feb. 1959, *Blake* 20522 (Dec. 1959, *Blake* 21186); Mt. Merino, ± 1080 m, Aug. 1958, *Blake n.s.* (Feb. 1959, *Blake* 20516); slopes of Springbrook, in 1957, *Trapnell n.s.* (Mar. 1958, *Blake* 20332); Springbrook, May 1958, *Jones* (Jan. 1959, *Blake* 20504); Tallebudgera Ck., near Mt. Cougal, Jan. 1963, *Simmonds.*

NEW SOUTH WALES.—FAR WESTERN PLAINS: between the Darling and Cooper's Creek, *Neilson.* NORTH WESTERN SLOPES: Moonbi, Nov. 1886, *Betche.* CENTRAL WESTERN SLOPES: Manildra, Nov. 1906, *Boorman*, Dec. 1907, *Boorman;* Hill End in 1885, *Lauterer* 64. NORTHERN TABLELANDS: Maryland, 900 m, Mar. 1885, *Hickey* 232; Mt. Lindesay, 930 m, May 1949, *Constable in NSW.* 10987; Jennings, Dec. 1903, *Maiden & Boorman;* Wallangarra, Apr. 1914, *Boorman;* Tenterfield, Apr. 1961, *Trapnell* A21; Timbarra, *Stuart* 443 p.p.; Demon Ck., *Stuart* 94 and 443 p.p.; Mt. Donalson, *Stuart;* Doughboy Ck., between Guyra and Ebor, Apr. 1961, *Trapnell* A94 (May 1963, *Trapnell*); Dorrigo, Jan. 1918, *Cleland;* Glen Innes, Apr. 1885, *Porter;* " Tilbuster ", Armidale, Apr. 1907, *Stopford* 48; Moona Plains, Walcha, Jan. 1885, *Crawford* 388. NORTH COAST: Tweed Heads, Feb. 1907, *White*?; Tweed River, *Guilfoyle;* Chinderah, Nov. 1959, *Trapnell;* Hastings Point, July 1959, *Trapnell* (Feb. 1964, *Blake* 22145); Byron Bay, Feb. 1963, *Clifford;* Richmond River in 1877, *Fawcett* 239, *Henderson;* Whian Whian State Forest near Lismore, May 1958, *W. T. Jones;* Deep Ck., Casino, Apr. 1914, *Baggs* 13; between Grafton and Glen Innes, *Cleland;* Clarence River, coll.?; Tower Hill Ck., Dalmorton, Nov. 1952, *Constable in NSW.* 24023; Sugarloaf, 5 miles W. of Ramornie, July 1922, *Blakely & Shiress;* Hob Head Mt., Korogora Point, 120 m, Jan. 1953, *Constable in NSW.* 22114; Orara River, *Thornton;* Nambucca River, Feb. 1897, coll.?; Macleay River, [*Beckler*]; Hastings River, *Beckler;* Mt. Bulahdelah, Oct. 1951, *Ford;* Upper Williams River, Jan. 1936 and Nov. 1936, *Fraser & Vickery;* Elizabeth Beach, 9 miles S. of Forster, Aug. 1957, *Gray* 4111; Port Stephens, *Burnett;* 9 miles SW. of Cessnock, Oct. 1959, *Story* 6719; Millfield, junction of Cedar and Deep Creeks, 300 m, Sept. 1954, *Constable in NSW.* 30770; near Millfield, Sept. 1960, *Renwick* (Jan. 1961, *Blake* 21447); near West Maitland, Mar. 1909, *Brewster;* Hunter R., *Oldfield, Parry.* CENTRAL COAST: Hawkesbury, coll.?; Broken Bay, Oct. 1896, *Morrison* 5457; St. Ives, Dec. 1952, *C. W. E. Moore* 2161; between Port Jackson and Blue Mtns., *Bauer;*

Parramatta, Woolls; Port Jackson, *R. Brown, Lesson, Sieber*, May 1802, *R. Brown;* Sydney and suburbs, Nov. 1835, *Backhouse* 190, Nov. 1881, *Betche*, Dec. 1902, *Camfield*, July 1902, *Camfield*, Apr. 1896, *Camfield*, Jan. 1948, *Constable in NSW.* 11630; Bolack, Feb. 1949, *Ford;* Liverpool, Oct. 1943, *Hilton;* Botany Bay in 1770, *Banks & Solander;* Clifton, Nov. 1896, *Morrison* 5333; Bulli Pass, Apr. 1896, *Morrison* 5276; Five Islands, July 1938, *Rodway* 6874; Minnamurra River, Feb. 1935, *Rodway* 6873; Kiama, Dec. 1899, *Camfield;* Saddleback Mtn., Kiama, 480 m, Jan. 1955, *Constable in NSW.* 30804. CENTRAL TABLELANDS: Bathurst, Oct. 1822, *Cunningham* 112/1822; Horsehoe Bend, Grose Valley, Mar. 1910, *Carne;* The Valley, Blue Mtns., Jan. 1887, *Fletcher;* Wolgan Valley, Blue Mtns., Dec. 1918, *Petrie;* Kowmung River, up to 900 m, Mar. 1948, *Johnson in NSW.* 5096; Gingra Ck., Mar. 1951, *Johnson.* SOUTH COAST: Coolangatta Hill, June 1941, *Rodway* 12218; Shoalhaven, Aug. 1884, *Bäuerlen* 618; Shoalhaven Gorge near Tollong, Sept. 1950, *McN* ; Nowra, May 1916, *Rodway* 6866, Oct. 1948, *Rodway;* Bugong Ck., Aug. 1962, *Gray* 5249; Bomaderry Creek, near Nowra, Oct. 1930, *Rodway* 6868, Dec. 1944, *Rodway* 13752; Bowen I., Jervis Bay, Nov. 1919, *Rodway* 6869; Bateman Bay in 1884, *Bäuerlen;* Tollgate Is., South I., Dec. 1958, *Slater* 20, and " both islands," Apr. 1959, *Slater* 37; Montague I., June 1928, *W. H. Williams in hb. Rodway* 6870, Apr. 1932, *Rodway* 6871, Nov. 1959, *Costin;* Mt. Dromedary in 1881, *Bate* 86; Tilba Tilba, Nov. 1879, *E. Reader* 11; Bega, coll.?; Twofold Bay, coll.?; Eden to Pambula, Nov. 1901, *Maiden;* Green Cape, Dec. 1920, *Rodway* 6872.

VICTORIA.—GIPPSLAND: Dargo River, 300–900 m, Feb. 1883, *Stirling;* Snowy River, Feb. and Mar. 1854, *Mueller;* Tambo Valley Road in 1883, *Howitt* 50; Murendel River in 1882, *Howitt* 387; Gippsland in 1884, *Bell & Howitt* 96.

HAWAII.—Without further locality: *hb. Nuttall;* Sept.–Oct. 1836, *Gaudichaud; Remy* 403, 404; *Hillebrand; Rock.* KAUI: without further locality, *Knudsen;* Hanapepe and Wahiawa watersheds, June 1895, *Heller* 2467. OAHU: without further locality, *Mann & Brigham* 84, *Beechey*, May 1825, *Macrae;* Kawaihapai, 150 m, Jan. 1938, *Degener, Salucop & Arlantico* 11643; E. of Kawaihapai, Apr. 1931, *Degener* 17870; Pohakea Pass, July 1949, *Degener & Murashige* 20141, and Mar. 1957, *Degener & Degener* 24151 (Mar. 1958, *Blake* 20331); Waianae Range, north approach to Puu Kaua, ± 760 m, Feb. 1948, *Wilbur* 485; Koolau Range, Makoka Valley, Feb. 1909, *Forbes;* Honolulu, in 1889, *Jardin.* MAUI: Honokowai ditch trail, Mar. 1959, *Degener, Degener & Fleming* 25098. HAWAII: Between Huehue and Puuwaawaa, Feb. 1926, *Degener* 17876.

EUROPE, CULTIVATED.—Paris, Aug. 1822, *hb. Gay* (K); Montpelier, Nov. 1819, *Bentham* (K); Bonn, Sept. 1810, *Treviranus* (MEL); Berlin, *hb. Willdenow* 11078 (B), *Schlechtendal* (HAL), *hb. Reichenbach fil.* (W), Sept. 1830, *Bentham* (K); Vienna, *hb. Trattinick* (W); Leningrad (K).

ASIA, CULTIVATED.—Calcutta, in 1829, *Wallich* (K).

Widely spread in a variety of habitats from littoral forest to rainforest margins and exposed rock crevices to mountain tops at 1,200 m altitude as well as among rocks and under burnt logs in Eucalyptus forest and on sand. Some localities receive an annual rainfall in excess of 2,500 mm (100 in.) others as low as 600 mm (24 in.).

F. Muell. Descr. Notes Pap. Pl. 1: 90 (1877) recorded *Plectranthus parviflorus* Henckel from New Guinea on the basis of a specimen collected by D'Albertis along the Fly River, but the specimen is one of *Ocimum sanctum* L. or an allied species. Keng's report from New Guinea in Gard. Bull. Sing. 24: 150 (1969) was based on *Brass* 3578 and *Womersley* [*& Brass* in *NGF.*] 11010; both collections belong to *P. congestus* and Keng cited " *Womersley NGF* 11010 " under this name on the same page. The records of *P. parviflorus* in Lord Howe Island by Maiden in Proc. Linn. Soc. N.S.W. 23: 132 (1898) and W. R. B. Oliver in Trans. N.Z. Inst. 49: 150 (1917) are based on a specimen of *P. graveolens.*

References to *P. parviflorus* in Timor are based on specimens of other species. Gaudichaud, Voy. Uranie et Physicienne, Bot. 41 (1826) included *P. australis* in a list of plants around settlements in Timor, and it must have been this that Decaisne

had in mind when he reported the species from Timor " fide Gaudichaud " in Herb. Timor. Descr. 69–70 (1835). There is at Paris, hb. Drake in hb. Richard, an old specimen of *Coleus* (*C. blumei* ?) labelled " Plectranthus parviflorus L'Herit." without collector's name that may have been collected by Gaudichaud. The report of *P. parviflorus* by Forbes, A Naturalist's Wanderings in the Eastern Archipelago 514 (1885) was based on a specimen of *P. congestus*. The report by Keng, loc. cit., was based on specimens of *P. congestus* (*Forbes* 3888 also cited under *P. javanicus* (Bl.) Benth. on p. 142) and *P. klossii* (*van Steenis* 18243 and *Walsh* 378).

Schumann & Lauterbach, Fl. Deutsch. Schutzgeb. Südsee 529 (1901), quoting Guppy, Solomon Islands 300 (1887), stated that *P. parviflorus* occurred in the Solomon Islands, but I have seen no specimen from this area.

Briquet, Natürl. Pfl.-fam. IV, 3a: 357 (1895) included Mauritius in the range of *P. parviflorus* (as *P. parviflorus* " R.Br." var. *australis*). The specimens from Mauritius differ from those from Australia in having glands on the stem, more spreading hairs less evidently retrorse and sometimes tending to be antrorse, few short hairs, leaf-blades with usually only 4–5 pairs of teeth and 3–4 pairs of veins sometimes decurrent on the petiole, and a corolla with a broader scarcely sigmoid tube and glands on all lobes as well as the tube. Bentham, Lab. Gen. et Sp. 37–8 (1832) referred those he saw to *P. madagascariensis* (Pers.) Benth. loc. cit., based on *Ocymum madagascariense* Pers. Syn. Veg. 2: 135 (1806) which was described from a specimen in hb. Jussieu collected by Commerson stated to be from Madagascar. The specimen (P, now in the general herbarium and shown in Fig. 28B with some labelling omitted) written up by Persoon has two labels with Commerson's writing giving the locality " isle de Bourbon " [Réunion] on one and " isle de france " [Mauritius] with the number 266 on the other; Persoon's citation of Madagascar is a mistake. Bentham, op. cit. 709 referred *Ocimum hadiense* Forssk. Fl. Aegypt.–Arab. 109 (1775) from southern Arabia to this species, but E. A. Bruce, Kew Bull. 1935: 323 (1935) stated that Forsskaal's plant was a true *Ocimum*. At the same time Bruce stated that *P. madagascariensis* differed from *P. aegyptiacus* (Forssk.) C. Chr. Dansk Bot. Arkiv 4: 21 (1922) (*P. forskalaei* Vahl) from Ethiopia, Somaliland and southern Arabia to which it was referred by Christensen, loc. cit.

P. parviflorus is readily distinguished in the field by its tuberous base (Fig. 19, 20). The tuber formed at ground level is well developed in seedlings before the second pair of leaves is produced. After flowering the stems commonly die down almost to the tuber, new shoots arising from the lowermost part of existing stems and from the tuber. The leaves vary in shape, texture and density of indumentum more than in the other species, but much of the variation is certainly correlated with exposure and soil moisture; plants in damp and shady places tend to have thinner, less hairy, more deeply toothed leaves with longer petioles than those in dry sunny habitats. The indumentum on the stems is likewise variable, especially as to the frequency of the longer hairs. Most of the Hawaiian specimens have a dense indumentum throughout but so have some Australian ones, and almost the two extremes occur on self-sown plants in my garden; Hawaiian plants grown in a wet shady place in Brisbane became less densely hairy.

Goy & Smith 264, Tracy's plant from Cainbable, *Trapnell* A94, Trapnell's plants from Hastings Point, Clifford's plant from seacliffs at Byron Bay, Henderson's plants from the Richmond River and *Hickey* 232 from Maryland are as shaggy as any of the Hawaiian specimens. At the other extreme, the plants represented by *Blake* 20332 are almost glabrous with more or less shining purplish stems, shining rich green leaves, mostly 6-flowered verticillasters and pale flowers with the corolla tube sometimes only weakly bent. Only a few plants from one locality have been found and at first sight they look very different from the average of the species. The differences tend to persist under cultivation, but *Blake* 20522 and 21186 (the latter cultivated from the former) are scarcely more hairy though paler in colour of stems and foliage.

The number of teeth to the leaves is fairly constant but plants in damp shady places in the garden have produced a few leaves with up to 12 teeth on each edge. *Armit* 758 has many glands on the stem and the nutlets (1·1–1·15 x 0·95–1·1 mm) are slightly larger than usual.

Under some conditions in Australia and Hawaii, cleistogamous flowers are produced with small corollas sometimes scarcely exceeding the calyx (Fig. 4B *x–z*).

An occasional specimen from New South Wales has ± ascending hairs on the stem and it is not clear whether the direction is natural or the result of handling, for the specimens otherwise are characteristic of *P. parviflorus*. *Johnson* 1102 from Blackdown Tableland, Leichhardt District, Queensland, also has ascending hairs, the corolla is more extensively bent than is characteristic of *P. parviflorus* and the nutlets somewhat larger than usual (about 1·05–1·1 x 0·95–1 mm). The dense indumentum gives to the specimens somewhat the appearance of *P. gratus* from which they differ in the very obtuse upper lip of the calyx; the denseness of the indumentum disagrees with *P. apreptus;* and the specimens differ from both species in having fewer (6–10) pairs of leaf-teeth and abundant gland-tipped hairs in the inflorescence. *Gittins* 906 from Rockland Spring near by without fruiting calyces and with unusually large corollas 13–15 mm long is otherwise very similar. These two collections may represent an undescribed species.

Another puzzling plant, *Trapnell* A162 (*Blake* 21687, 21989, 22053) from Dorrigo, North Coast, N.S.W., resembles some stout states of *P. parviflorus* but differs in having at least partly 4-celled glands, leaves with frequent glands on the upper surface and about 8–16 pairs of teeth, bracts up to 3 mm long, and less bent, more gently curved corolla-tube. The low stainability of pollen (66%) suggests a hybrid origin, and the 4-celled glands, number of leaf-teeth, larger bracts and more gently bent corolla-tube suggest *P. argentatus* as the other parent except for the fact that *P. argentatus* has not been found anywhere near this locality. Only one plant was found by the collector.

The names *Plectranthus parviflorus* Willd., *P. parviflorus* Spreng. in Henckel (usually cited as *P. parviflorus* Henckel) and *P. paniculatus* were all founded on cultivated plants, the first grown at Berlin, the second at Halle, the third at Vienna. Henckel gave Peru as the country of origin of the plant, but the origin of the others was said to be unknown. I have had the exceptional privilege of being able to study Willdenow's type (*hb. Willdenow* 11078) of which I had earlier received photographs

(Fig. 21A) showing the label on the folder. On this label, Peru is given as the locality. If any specimen of *P. parviflorus* Spreng. in Henckel had been preserved at the time, it would have been in the Sprengel Herbarium at Berlin, destroyed during the 1939–1945 war, according to Dr. R. Werner. As Dr. Werner and Dr. Buchheim have pointed out, some new names in Henckel's work are ascribed to Sprengel in the index, so that the correct citation is *Plectranthus parviflorus* Spreng. in Henckel.

From Halle I have seen a specimen labelled by Schlechtendal *Plectranthus parviflorus* Hort. Bot. Berol. which very closely resembles the Willdenow type and may be from the same plant or its progeny. Dr. Rechinger informed me that there is no specimen at Vienna that can certainly be accepted as the type of *P. paniculatus*, but sent on loan a specimen from hb. Trattinick that agrees with part of Jacquin's plate. Trattinick was Director of the Garden in Jacquin's time and the specimen was labelled *P. paniculatus* Jacq. later altered to *P. parviflorus* Willd. and *P. Forskolaei*. It could well have come from the plants described by Jacquin. *P. paniculatus* Baker in Thistleton–Dyer, Fl. Trop. Afr. 5: 419 (1900) is a later homonym based on specimens of a very different African species that has been transferred to *Homalocheilos* J. K. Morton as *H. paniculatus* J. K. Morton, J. Linn. Soc. London 58: 270 (1962), which is a species of *Rabdosia* (see pp. 4, 5).

The plants described by Willdenow and Jacquin are certainly conspecific with one another and with the plants described by R. Brown as *P. australis*. Henckel's (or Sprengel's) elaborate description applies well enough to the same species. Willdenow's description was shown by Stearn, J. Bot. 75: 234 (1937) to have been published in the first half of 1806, not in 1816 as sometimes quoted. Dr. Stearn kindly investigated the date of publication of Jacquin's work, usually quoted as 1800–1809, and came to the conclusion that *P. paniculatus* was published most probably in 1808 or at any rate not earlier than 1807. He could not find the month of publication of Henckel's work but it seems to have been later than Willdenow's, since the locality on the label to Willdenow's specimen appears to have been added after the latter's account was published, probably from Henckel's work, while Sprengel, Syst. Veg. 2: 691 (1825) mentioned only *P. parviflorus* Willd.

Dr. Buchheim has found two early apparently unrecorded references to the use of the name *P. parviflorus* by Sprengel. Under the title " Rechenschaft von der Aussaat und Aernte im botanischen Garten 1805 (Beschluss) " in Gartenzeitung 3 (20): 153–160 (15 November 1805) (edited by Sprengel at Halle) there is on p. 155 the entry: " 178. *Plectranthus parviflorus*, eine H u m b o l d t-sche Pflanze, wahrscheinlich aus Cumaná, die sehr reichlich bey mir geblüht hat. Ihre Blätter sind eyförmig und grob gezähnt, die Blüthen sitzen in Wirbeln, die zusammen eine Traube bilden, sind schön blau, geben aber einen unangenehmen Geruch." Then in Sprengel, Index plantarum quae in horto botanico Halense anno 1807 viguerunt (Halle 1807 Gebauer) on p. 49 is the entry " *Plectranthus parviflorus* Spreng. apud Henckel a.s." [a = annuae; s = semina]. These entries refer to plants grown in the Botanic Garden at Halle in 1805 and 1807. The first may be translated as follows: 178. *Plectranthus parviflorus*, a plant collected by Humboldt, probably from Cumaná,

which has flowered very freely with me. Its leaves are ovate and coarsely toothed, the flowers set in whorls which together form a raceme are beautifully blue but give off a disagreeable smell.

The first of these (in 1805) is clearly the earliest use of the name *Plectranthus parviflorus*. However, Sprengel's account mentions no character that is not common to all species of the genus known at the time. From Art. 32, Art. 44, and Rec. 32B a description or a diagnosis in the sense of the Code must include words that would serve to distinguish the taxon from other taxa. The fact that Sprengel did not cite this publication in the extensive account in Henckel's work might be explained by supposing that Sprengel prepared it before the other and that it had left his hands before that part of the Gartenzeitung appeared. The latter was published in November but in the former he stated that the plant flowered in August when the description must have been drawn up. The absence of a Latin description may be evidence that Sprengel did not intend his account as scientific publication of a name. If Sprengel did believe that the 1805 account constituted publication of the name he would surely have quoted " Spreng." not " Spreng. apud Henckel " in 1807, and the former might be rejected under Art. 34, especially (3) and Note 2.

Finally, in Syst. Veg. 2: 691 (1825) Sprengel cited only *P.* " *parviflorus* W." with the locality "Amer. austr.". Here it seems that Sprengel identified his plant with Willdenow's and treated Willdenow's name as having priority. That is, he again rejected his 1805 publication and provided evidence that the description must have been drawn up in August 1805, not August 1806 by which time he would surely have seen Willdenow's account which was published in the first half of 1806.

It will be seen that in 1805 Sprengel implied that his plants were raised from seed gathered by Humboldt at Cumaná (Venezuela) while in 1806 he gave the place of origin as Huánuco, Peru, a locality not visited by Humboldt, according to Buchheim. But his description in 1806 cannot be reconciled with any American genus. The account of a flower with a 2-lipped calyx with the upper lip ovate and the lower lip 4-fid with narrow lobes, a " resupinate " corolla, and declinate stamens can only refer to a genus of the Ocimoideae; the concave lower lip of the corolla, the small lateral lobes of its upper lip, the bifid stigma, the broad upper lip of the calyx and the narrow lobes of the lower lip together with the inflorescence exclude all genera except *Plectranthus*. The one discordant character is the scarcely changed fruiting calyx with connivent lobes but this cannot be reconciled with any other likely genus. In *Plectranthus*, the fruiting calyx is considerably enlarged and thin with the upper lip more or less recurved, but well before maturity the lobes are connivent, and this is probably the state described by Sprengel, especially as the " seeds " are said to be white. I have not seen petioles longer than the leaves in *P. parviflorus* Willd. and I am not sure what Sprengel meant by the calyx " glanduloso pilosum "; otherwise the description agrees well with this species.

The statement in 1807 that the plant is an annual may refer to stems only. There is however at Melbourne, a specimen that may be considered in the interpretation of Sprengel's names. The label is of plain paper with handwriting reading: Plectranthus parviflorus Spreng/Ex horto meo./L. d. 2 Sept. 1810/. I interpret " L. d." as " Legi die ". Because the author of the name is given as Sprengel and the

year of collection is well after the publication of Willdenow's work, it would seem that the plant had been grown from material supplied by Sprengel to someone who was better acquainted with Sprengel than with Willdenow. Mr. A. B. Court has identified the writing as that of L. C. Treviranus. According to Mr. J. H. Willis (in litt.) Treviranus accumulated a large herbarium at Bonn, mainly of cultivated plants, and many of his specimens are now in hb. Melbourne, apparently acquired with the Sonder Herbarium.

The conclusion is that *Plectranthus parviflorus* Willd. is the correct name for the species. *P. parviflorus* Spreng. in Henckel is a synonym, published in the same year, probably somewhat later, but cannot be typified by a specimen. *P. parviflorus* Spreng. 1805 is a nomen nudum and does not affect the legitimacy of *P. parviflorus* Willd.

Plectranthus australis was based on specimens collected by Brown at Port Jackson. In a letter, W. T. Stearn has stated that there are several sheets at the British Museum collected at Port Jackson by Brown and he has selected as lectotype a sheet with specimens in flower and fruit collected 17th May, 1802, and described by Brown in his MS. on 19th May. A photo of this sheet is at Brisbane part of which is shown in Fig. 21B. There are six pieces with two labels both written up by Brown. The lectotype consists of four pieces collected " ad vias & in subhumidis ubique "; the locality on the other label is " Port Jackson ". All pieces have short indumentum. Some of Brown's specimens are at Edinburgh, Kew and Brisbane.

Bentham apparently saw the type of *P. parviflorus* Willd. identifying it with *P. graveolens* R. Br. of which he had seen an isotype in Hb. Delessert, but included specimens from Hawaii in his account of *P. parviflorus*. He distinguished it from *P. australis* by the shrubby habit and smaller leaves and flowers (Benth. Lab. 36–37). At the same time he described *P. forsteri* from specimens from Tana relying on the short corolla, sparse indumentum and long petioles as distinguishing characters, and shortly afterwards *P. sieberi* from a specimen at Vienna from tropical Australia collected by Sieber, with root thickened at top (" Radix apice incrassata "), 6-flowered verticillasters and setaceous lower lobes of the calyx. The type of this must be the specimen now in hb. Bentham (K) with a label in Bentham's writing reading: Plectranthus Sieberi Benth./Lab. 710/Australia Sieber/Herb. Mus. Vind. 1835/. It is a small plant about 25 cm high showing the tuberous base characteristic of *P. parviflorus* (not a thickened root) and overmature fruiting calyces showing some shrinkage of tissue which is the cause of the setaceous tips of the lower lobes. The specimen seen earlier from Vienna supposed to be the type was collected by Bauer between Port Jackson and the Blue Mountains. The type of *P. parviflorus* var. ? *elatior* is an average sheet of *P. parviflorus* but the locality is quite remote from any other from which a specimen of the genus has been collected; it probably came from Port Jackson like some other specimens of Armstrong's labelled as from Port Essington.

In Fl. Aust. 5: 78 (1870) Bentham stated that with a wider range of material he now had before him he found it impossible to distinguish between *P. australis*, *P. graveolens*, *P. parviflorus* and (by implication) *P. forsteri* and he referred all specimens to *P. parviflorus* without mentioning *P. sieberi* or *P. parviflorus* var. ? *elatior*. From an examination of an even wider range of specimens and many living

plants in cultivation and in the field, it seems to me that *P. parviflorus* and *P. graveolens* are well distinct in habit, odour, indumentum, toothing of the leaf and shape of corolla. The Central Australian specimens referred here by Bentham represent a third species described on p. 33 as *P. intraterraneus* and *P. forsteri* is also distinct.

Most later workers have followed the treatment in Flora Australiensis, though Briquet, F. M. Bailey, and Domin treated *P. graveolens* as varietally distinct. Mueller quoted the name sometimes as *Plectranthus parviflorus* Willd. sometimes as *P. parviflorus* Henckel; the latter was adopted by Moore & Betche, Handb. Fl. N.S.W. 348 (1893), Maiden & Betche, Census N.S.W. Pl. 178 (1916), Ewart, Fl. Vict. 991 (1930), and J. M. Black, Fl. S. Aust. 489 (1926), ed. 2: 734 (1957). Briquet, loc. cit., probably by mistake, quoted *P. parviflorus* R. Br. which is *Basilicum polystachyon* (L.) Moench. The names *P. parviflorus* var. *minor* and *P. parviflorus* var. *major* were published without description. Bailey's figures as well as the one in Lodd. Bot. Cab. t. 1185 to which he referred represent states of *P. parviflorus*.

P. australis R. Br. var. *vulgaris* Domin was based nomenclaturally on *P. australis* R. Br. The diagnosis refers to this and most of the specimens cited belong, but one from Cape False (no. 8189) belongs to *P. diversus*. Domin's diagnosis of *P. australis* var. *vulgaris* forma *densiflorus* can only refer to his no. 8190 from Tamborine Mtn. because this is more robust and more densely flowered than his other specimens and comes from the locality cited. It must be accepted as the type although it is labelled merely "*Plectranthus australis* R. Br. var. *vulgaris* Domin var. n." and three other sheets are labelled "*Plectranthus australis* R. Br. var. *vulgaris* Domin f. *densiflorus* var. et f. n.", but these are ± slender specimens with loose or somewhat loose inflorescences.

Trimen, Handb. Fl. Ceylon 3: 371–2, in his discussion of *P. zeylanicus* Benth. stated that this is not wild in Ceylon and that "It does not appear to differ materially from *P. parviflorus*, Willd., of the Pacific Is. and Australia . . . . . save in its smaller and paler flowers." Bentham mentioned the similarity in his protologue. I have seen the type (Fig. 28A, Ceylon in 1829, *Macrae* 807–CGE) and believe it to represent a species of Natal and Transvaal later described as *P. tomentosus* Benth. in E. Mey. Comment. Pl. Afr. Aust. 229 (1838) based on a specimen from near Durban collected by Drege (K). I have seen several specimens from Natal and one from a plant "possibly planted" at Bakelalan, Sarawak, 900 m, Aug. 1955, *Brooke* 10512. The last was identified with *Coleus amboinicus* Lour. by Keng, Gard. Bull. Sing. 24: 51 (1969). The flowers are not smaller than those of *P. parviflorus*, but rather larger than the generality of the latter, but the main distinguishing characters are the rather distinct gibbosity on the lower side of the corolla-tube near the base more pronounced than in any Australian species, the longer flowering calyx with relatively shorter lowermost lobes, somewhat decurrent upper lip of the fruiting calyx, larger bracts, and the more numerous leaf-teeth (about 10–15 pairs).

In the account of *Germanea australis*, Britten stated that Banks & Solander collected the species at Cape Grafton, Botany Bay, Bustard Bay, Port Jackson and Endeavour River. The plate, based on a sketch by Parkinson from a plant from Cape Grafton according to Stearn *in litt.*, represents *P. apreptus* (see under that species) and Solander's description quoted by Britten on page 75 could apply to either *P.*

apreptus or *P. parviflorus*. Banks and Solander collected *P. parviflorus* at Botany Bay (NSW, BM (as an impression BRI)) identifying the specimens with *Ocymum scutellarioides* L. They collected it again at Bustard Bay and described the specimens in MS. as *Ocymum tetrum*, but no name with this epithet has even been published. The specimens (BM) are distributed on two sheets, one of which is labelled " tetrum " " Botany Bay or Endeavour River," and the other has a label in R. Brown's writing reading: Ocymum tetrum/Bustard Bay or Endea/vour River 1770/. The specimens are centainly of *P. parviflorus* and it is most unlikely that they could have come from the Endeavour River; they are much more slender and smaller than those on the Botany Bay sheet with inflorescences mostly in fruit. It would seem that Bustard Bay is the correct locality. The mention of Endeavour River on the two sheets seems to be the basis of Britten's citation of this locality, but his inclusion of Port Jackson must have resulted from confusion with a Brown specimen since Banks and Solander did not visit Port Jackson.

P. parviflorus R. Br. Prodr. 506 (1810) is *Basilicum polystachyon* (L.) Moench as mentioned above, and *P. parviflorus* Guerke in O. Ktze Rev. Gen. Pl. 3 (2): 261 (1898) (*P. kunzeanus* Domin, Biblioth. Bot. 89: 564 (1928), non *P. kunzei* Guerke) is a very different African species.

12. Plectranthus forsteri Benth. Lab. Gen. et Sp. 38 (1832). Type: Tana, *J. R. & G. Forster* (holotype BM (not seen), photo BRI).

Ocimum pusillum Forst. Prodr. n. 527 (1786), nomen. Type: Tana, *J. R. & G. Forster*.

Subshrub or perennial herb with a sweetish odour; stems or branches erect or ascending with the lower part sometimes straggling, up to 1 m long (Gibbs), the upper part pubescent or sparsely pubescent with short hairs and also longer antrorse (rarely retrorse) hairs up to 0·55 mm long with up to 8 cells, with ± scattered sessile glands, sometimes with a few minute gland-tipped hairs added. Leaves long-petiolate, paler beneath, thin, nearly flat when dry; petiole from half as long to as long as the blade; blade ovate to very broadly ovate, more or less obtuse, subcordate to subcuneate, coarsely crenate or somewhat serrate-crenate to ± repand with 3–6 pairs of ± antrorse teeth, sometimes 1 or more with a secondary tooth, pubescent to glabrescent on both surfaces without gland-tipped hairs, densely glandular beneath, sparsely so above, 1·5–3·5 cm long, 1–3 cm wide, from as long as wide up to 1·5 times as long as wide with 3–5 pairs of slender not very prominent veins. Racemes pedunculate, solitary, 7–25 cm long; axis pubescent with longer antrorse hairs and minute gland-tipped hairs and with sessile glands; bracts broadly ovate to very broadly ovate, sometimes glabrous on the back, 1·2–1·8 mm long, early deciduous; verticillasters (6–) 10-flowered, about 5–12 mm apart; pedicels 1·5–4 mm long, antrorsely shortly pubescent and with minute gland-tipped hairs. Flowers " very pale blue," " bluish ", or " mauve ", unusually small. Calyx 1·3–2·5 mm long, rigidly shortly pubescent and with many sessile glands and minute gland-tipped hairs. Corolla 3–8 mm long, ± pubescent on upper and lower lobes and sometimes on the tube, glandular on the upper lobes, lower lip and frequently the lateral lobes; tube decurved at an angle of about 140°–150° with the upper side often nearly straight,

or on the smaller flowers the whole tube nearly straight and then ± narrowed about the middle; lateral lobes ovate; lower lip somewhat shorter to much shorter than the tube. Fruiting calyx 3·5–4·5 mm long, sometimes glabrescent; upper lip circular-ovate or very broadly ovate, broadly acute to obtuse, subacuminate or apiculate, about half as long as the calyx; lateral lobes obliquely triangular, acute, nearly straight, about as long as the upper lip or a little shorter, 0·9–1 mm wide; lower lobes narrowly triangular acute, slightly the longest, 0·7–0·8 mm wide. Nutlets dark brown, shining, subcircular, 0·7–1 mm long, 0·65–0·9 mm wide.—Figs. 2Q, 4C, 17D, 22, 31.

NEW HEBRIDES.—EROMANGA: *MacGillivray;* Dillon Bay, 0 m, May 1928, *Kajewski* 258. TANA: Aug. 1774, J. R. & G. Forster (photo).

NEW CALEDONIA.—Without definite locality: in 1886, *Roberts;* in 1887, *Hodgson*; *Pancher in Mus. Neocal.* 265. [Near Harcourt Bay], *Labillardière;* Poum, *Leenhardt* 71; Koumac, *Deplanche* 85; mountains near Oubatche, 600 m, Dec. 1902, *Schlechter* 15558; Ignambi, June 1925, *Däniker* 98a; Gomen, *Leenhardt* 54; Poindala near Koné, Feb. 1925, *Däniker* 1070; Ponérihouen, *Leenhardt* 486; Poya, *Leenhardt* 400; Houaïlou, *Leenhardt* 220; Mt. Nopéa near Bourail, Sept. 1924, *Däniker* 98; Ngoye, Nov. 1902, *Schlechter* 15292; E. of Tamoa towards Col de la Pirogue, Dec. 1924, *Däniker* 98A; Mont Mou, 240 m, Mar. 1914, *Compton* 599; hills near Païta, 150 m, Sept. 1902, *Schlechter* 14823; Ilot de Freycinet, Aug. 1884, *Grunow;* Nouméa, *Vieillard* 1055, 1056 and Sept. 1868, *Balansa* 488; Yaté, *Franc* 2051; Ile des Pins, Oct. 1853, *MacGillivray* 799.

LOYALTY ISLANDS.—OUVÉA: Naia, Aug. 1905, *Däniker* 1938. LIFOU: St. Paul, Sept. 1925, *Däniker* 1957, 1957a. MARÉ: without further locality, *Leenhardt* 474; Ro. Jan. 1926, *Däniker* 3123; Wakone, Dec. 1925, *Däniker* 2630a; Péde, Dec. 1925, *Däniker* 2630.

FIJI.—Without definite locality: in 1840, *Hinds*; Nov. 1855, *Harvey*. TAVEUNI: Somosomo, May 1860, *Seemann*. VITI LEVU: without definite locality, *Graeffe* 1456; Nadarivatu, 750–900 m, Sept. 1907, *Gibbs* 650; Mt. Batilamu, Jan. 1965, *Koroiveibau in Dept. Agr.* 14129; eastern slopes of Mt. Koroyanitu, 905–1,050 m, May 1947, *A. C. Smith* 4238; near Lautoka, 600 m, *Greenwood* 100; Mt. Evans, May 1919, *Greenwood* 131, 238; Rewa River, in 1884, coll.?. NUKALAU: [in 1840] *Barclay*. OVALAU: Lovoni Valley, [Aug. 1865], *Veitch;* Levuka, *Carsons*. MOALA: Sept. 1854, *Milne* 115.

SAMOA.—Without further locality, *U. S. Pacific Exploring Exped.*

Bentham described the species entirely from Forsters' material, relying on the nearly glabrous nature of the plant, the long petioles, relatively minute flowers and small fruiting calyx for the diagnostic characters. In Fl. Aust. 5: 78 (1870) he implied that from the far greater range of material now available he could not distinguish the plants from New Caledonia and other Pacific Islands from the Australian *P. parviflorus*. Fijian specimens were referred to *P. forsteri* by Seemann, Fl. Vit. 192 and t. 47 (1866) but those from New Caledonia have usually been referred to *P. parviflorus*, apparently following Bentham's remark in Fl. Aust. Although it agrees with *P. parviflorus* in the thin leaves with few teeth, absence of prominent gland-tipped hairs on branches and leaves, general structure of the raceme, bracts, form of the fruiting calyx and variability in the density of the indumentum, it differs in the somewhat more shrubby habit without a tuberous base, usually antrorse hairs, relatively longer petiole, relatively numerous glands on the upper surface of the leaf and commonly small to very small corolla with the relatively broad tube either nearly straight or constricted about the middle with the lower side gently decurved. *Gibbs* 650 and *Schlechter* 14823 have almost no glands on the upper surface of the leaf. Kajewski's

specimens, from the sea-shore, without base, in advanced fruit without flowers, have most of the hairs retrorse on the lower part of both the stem and midrib beneath; the leaves with glands above and very long petioles and small fruiting calyx are those of *P. forsteri*, not *P. parviflorus*. Retrorse hairs also occur on a few collections from New Caledonia and the Loyalty Islands. The corolla is usually 3·5–6 mm long, but on *Däniker* 1957 it is up to 8 mm long with the tube about twice as long as the lower lip. One piece of *Compton* 599 (BM) has most hairs ± retrorse, perhaps caused during gluing down, and corollas up to 7 mm long. This collection was recorded as from a weed in old cultivation and Seemann stated that the species was a common weed of cultivation in Fiji. Gibbs, Greenwood, Pancher, Smith and Vieillard collected their specimens from exposed rocky places. Däniker's specimens are mostly from rocks, those from the Loyalty Islands mostly on the coast; his 98a (not 98A) and 1070 are from forest margins. Milne's collection was from " waste places, frequent " and *MacGillivray* 799 from " margins of thickets."

A form with the leaves variegated with yellow is in cultivation under the name of *P. coleoides* (see p. 8) but at least in Brisbane it very rarely flowers. A completely green reversion was propagated in the Brisbane Botanic Gardens but has not flowered. *P. coleoides* Benth. is a very different Indian species.

Seemann and also Guillaumin, J. Arnold Arb. 13: 29 (1932) reported *P. forsteri* from Aneityum (New Hebrides) but this record may be based on *MacGillivray* 16, a specimen of *Coleus scutellarioides* (L.) Benth. mounted on the same sheet with MacGillivray's specimen from Eromanga (BM).

Parham, Pl. Fiji Is. 255 (1964) cited " laca ", " dranumi " and " sede " as vernacular names for the species in Fiji. According to Leenhardt's labels " meamori ", " ntigice " and " derhi " are vernacular names in New Caledonia.

13. Plectranthus apreptus S. T. Blake, species nova, affinis *P. parvifloro* Willd., *P. forsteri* Benth. et *P. grato* S. T. Blake, ab hoc praecipue habitu minus fruticoso atque foliis tenuioribus longius petiolatis atque pilis brevioribus minus densis quorum nonnullis minutis glandulosis, ab illis foliorum dentibus pluribus atque tubo corollae abrupte grosseque defracto, a *P. parvifloro* etiam pilis omnibus antrorsis differt. Typus: Freshwater Creek prope Cairns in Queensland, *Blake* 21730 (BRI.100703–4); isotypi distribuendi. *Ocymum inodorum* Soland. MS., non Burm. f.

Herba perennis vel suffrutex, inodora, 30–150 cm alta, pilis brevibus antrorsis et nonnullis minimis glandulosis pubescens. Caules ramique inferne lignescentes saepe decumbentes infra inflorescentias sine glandulis sessilibus, pilis antrorsis vel puberuli vel laxe saepe parce pubescentes, pilis minutis glandulosis paucis additis. Folia tenuia longe petiolata, petiolis $\frac{1}{4}$–$\frac{2}{3}$ laminae adaequantibus; laminae vel ovatae vel circulari-ovatae vel subcirculares, obtusae vel acutae, basi late rotundatae usque late cuneatae, dentium paribus 7–15 vel crenatae vel dentato-crenatae vel admodum serratae, utrinque pilis antrorsis etiam cum pilis glandulosis minutis pubescentes, subtus glandulis crebris flavidis conspersae, pro more 2·5–8·5 cm longae et 2–7 cm latae. Racemi plerumque 1–3, 6–25 cm longi; axis pilis antrorsis et pilis glandulosis minutis parce pubescens atque glandulas sessiles raras gerens; bracteae circulari-ovatae usque ovatae, circa 1·2–1·8 mm longae, mox caducae; verticillastri pro more 6–10-flori, circa 5–15 mm distantes; pedicelli 2·5–7·5 mm longi, pilis eglandulosis et pilis minutis glandulosis hirtelli. Flores caerulei. Calyx 1·7–2·6 mm longus. Corolla 7–13 mm longa lobis supremis et labio infero glanduligera ± hirtella; tubus prope medium ad angulum 90°–120° abrupte deflexus deinde leviter inflatus, sub ore leviter obliquo constrictus; lobi

superiores subcirculares, laterales oblique ovati, infimus tubo subaequilongus. Calyx fructifer 4·5–5·5 mm longus, glabrescens; labium superum late vel latissime ovatum, tubo fere aequilongum; lobi laterales angustiores, sesquies usque paullo plus duplo longiores quam latiores, admodum breviores, falcato-triangulares, acuti; lobi inferiores anguste triangulares acuti, ceteris ± longiores conspicue angustiores, fere ter usque plus quater longiores quam latiores, incurvi. Nuculae saturate brunneae vel nigrae, lucidae, circulari-ovatae, 0·8–0·85 mm longae, 0·75–0·8 mm latae.—Figg. 2P, 4D, 23, 35.

Scentless subshrub 30–150 cm high; stems or branches erect or ascending, the lower woody part often straggling and up to 12 mm thick, the upper part puberulent or loosely, sparsely pubescent with antrorse 2–7-celled hairs up to 1·2 mm long but commonly much shorter and with occasional minute gland-tipped hairs but without sessile glands below the inflorescence. Leaves long-petiolate, dull green, paler beneath, thin, nearly flat when dry; petiole about $\frac{1}{4}$–$\frac{2}{3}$ as long as the blade; blade ovate, circular-ovate or subcircular, acute or (more usually) obtuse, very broadly rounded to broadly cuneate at base, crenate or dentate-crenate or somewhat serrate except near the base with 7–15 pairs of short broad teeth sometimes one or more with a secondary tooth, sparsely to moderately densely antrorsely pubescent on both sides with some minute gland-tipped hairs added, especially beneath, with many sessile yellowish glands beneath, mostly 2·5–8·5 cm long and 2–7 cm wide, from as long as wide up to 1·5 times as long as wide, the veins impressed above, prominent beneath. Racemes usually 1–3, pedunculate, about 6–25 cm long; axis sparsely pubescent with antrorse hairs and minute gland-tipped hairs, and with scattered sessile glands; bracts circular-ovate to ovate, coarsely pubescent, about 1·2–1·8 mm long, early deciduous; verticillasters 6–10 (–16)-flowered, about 5–15 (–20) mm apart; pedicels 2·5–7·5 mm long, hirtellous and with minute gland-tipped hairs. Flowers predominantly blue. Calyx 1·7–2·6 mm long, pubescent with gland-tipped and eglandular hairs and with sessile glands. Corolla 7–13 mm long; tube abruptly curved just below the middle making an angle of 90°–120°, slightly inflated upwards and then constricted to the slightly oblique mouth, glabrous; upper lobes subcircular, glandular and hirtellous; lateral lobes obliquely ovate, glabrous, eglandular; lower lip about as long as the tube, glandular and sparsely hirtellous. Fruiting calyx 4·5–5·5 mm long, glabrescent; upper lip broadly to very broadly ovate, sometimes broader than long, somewhat apiculate-acuminate or subacute, almost half as long; lateral lobes slightly shorter, falcate-triangular, 1·7–2·5 mm long, 1–1·4 mm wide, 1·5–2·3 times as long as wide; lowermost lobes narrowly triangular acute, 2–3·2 mm long, 0·6–0·8 mm wide, 2·8–4·5 times as long as wide. Nutlets shining, dark brown to black, circular-ovate, 0·8–0·85 mm long, 0·75–0·8 mm wide.—Figs. 2P, 4D, 23, 35.

QUEENSLAND.—COOK DISTRICT: Goode I., in 1881, *Powell* 8; Mt. Cook near Cooktown in 1885, *McKellar;* Endeavour River, in 1887, *Persieh* 102; Cooktown, coll.?; near mouth of Annan R., June 1968, *Stephens;* foot of Mt. Simon, ± 12 miles SSW. of Cooktown, Aug. 1959, *L. S. Smith* 10697; Annan Gorge, May 1968, *Stephens*, May 1970, *Blake, Correll & Stearn* 23390; Big Tableland, S. b E. of Cooktown, Sept. 1960, *Jones* (Feb. 1961, *Blake* 21454); Slatey Creek near Rossville, Oct. 1963, *Stephens;* just N. of Bloomfield River mouth, Sept. 1960, *Jones* (Jan. 1961, *Blake* 21444); summit of Mt. Demi, 900 m, Feb. 1932, *Brass* 2091; White Cliff Point, NW. of Cairns, 10–25 m, May 1962, *Blake* 21792 (Dec. 1962, *Blake* 21986); near Campbell Creek Falls, Oct. 1935, *Flecker in NQNC.* 935; Rocky Creek, Atherton–Mareeba Road, Sept. 1959, *L. S. Smith* 10802; Cairns Intake, July 1934, *Flecker;* at and near Cairns Intake, 70–110 m, May 1962, *Blake* 21730 (Nov.

1962, *Blake* 21975, May 1963, *Blake* 22045); Barron River in 1886, *Sayer;* False Cape, Jan. 1910, *Domin* 8188; Yarrabah, 550 m, Jan. 1910, *Domin* 8187; Yarrabah, July 1918, *Michael;* Cape Grafton, in 1770, *Banks & Solander*, Jan. 1910, *Domin* 8184.

P. apreptus resembles *P. forsteri* and *P. parviflorus* in the thin texture of the leaf, 6–10-flowered, well-spaced verticillasters with prominent pedicels and small bracts, and in the form of the fruiting calyx, while it also agrees with *P. forsteri* in habit and antrorse hairs on the leaf, stem, etc.; it differs from both in the more numerous leaf-teeth and the sharply and extensively bent corolla-tube and also from *P. forsteri* in the relatively shorter petiole, and the absence of glands on the branches, upper surface of the leaves and lateral lobes of the much larger corolla and their relative sparseness elsewhere; it further differs from *P. parviflorus* in being more woody below without a tuberous base. The flower is much like that of *P. gratus* but the calyx is smaller and glands are constantly absent from the lateral lobes of the corolla and it further differs in the less shrubby habit, longer petioles, thin texture of the leaves, sparse indumentum of shorter hairs, the presence of many minute gland-tipped hairs on leaves and axis, generally fewer-flowered verticillasters, somewhat smaller calyx in flower and constant absence of glands from the lateral lobes of the corolla. This species has no single peculiar character, a feature that suggested the epithet (ἀπρεπτος, undistinguished) but the sparse, short or very short indumentum of antrorse hairs and thin leaves with fairly numerous teeth are a combination not shared by any other species. It is figured in Britten, Bot. Cook's Voy. 2: t. 240 (1901) as *Germanea australis* (R. Br.) Britten; according to Stearn *in litt.* the plate was prepared from a sketch by Parkinson of Banks and Solander's plants from Cape Grafton.

14. Plectranthus gratus S. T. Blake, species nova, affinis *P. aprepto* S. T. Blake sed habitu certe fruticoso, indumento longo densoque, foliis breviuscule petiolatis distinguenda. Typus: Ex planta in Walsh's Pyramid in Queensland a R. F. Thorne lecta in Brisbane culta, *Blake* 21192 (BRI.100723–4); isotypi distribuendi.

Frutex inodorus usque fere metralis indumento denso pilorum antrorsorum (vel patulorum) usque 1·6 mm longorum indutus. Caules ramulique sine pilis glandulosis glandulisque vel pilis glandulosis minimis raris et glandulis perpaucis praediti. Folia breviuscule petiolata, petiolis circa $\frac{1}{5}$–$\frac{3}{10}$ laminae adaequantibus usque 15 mm longis; laminae crassae, ovatae usque latissime ovatae vel trullato-ovatae, acutae, subacuminatae vel obtusae, basi late ± cuneatae, dentium paribus 9–18 crenatae vel crenato-dentatae, utrinque villosae sine pilis glandulosis, subtus glandulas flavidas vel aurantiacas permultas indumento ± occultas ferentes, pro more 2·5–6 cm longae 1·5–5 cm latae. Racemi singuli vel pauci, 10–20 cm longi; axis antrorsum pubescens sine pilis glandulosis vel pilis glandulosis minimis raris praeditus sed glandulis carens; verticillastri 10–20-flori, 7–13 mm distantes; bracteae ovatae usque transverse ovatae, laxe pubescentes atque glandulosae, 1·5–2·7 mm longae; pedicelli 2–5 mm longi. Flores hyacinthini. Calyx 2·3–3·3 mm longus. Corolla 7–11 mm longa, lobis omnibus glandulas gerentibus superioribus infimoque ± hirtellis; tubus sursum vix dilatatus prope medium ad angulum 100°–120° decurvus ore fere rectus; lobi superiores subcirculares, laterales minimi rotundati, inferus tubo subaequilongus genitalia fere includens. Calyx fructifer 3·5–4·75 mm longus; labium superum latissime ovatum subacutum vel abrupte breviter acuminatum dimidio calyci subaequilongum; lobi laterales paullo breviores falcato-triangulares, acuti, duplo vel fere duplo longiores quam latiores, 0·9–1·1 mm lati; lobi inferiores lateralibus paullo (usque ad 0·5 mm) longiores anguste triangulares, acuti, haud plus connati, incurvi, 0·7–0·9 mm lati, ter vel fere ter longiores quam lati res. Nuculae brunneae vel atrae fere circulares 0·8–0·9 mm longae, 0·75–0·85 mm latae.—Figg. 2O, 4E, 24, 32.

Erect shrub to 80 cm high, the stems and branches at length hard, up to 7 mm thick, villous with ± spreading to sharply ascending trichomes up to 1·6 mm long with 3–8 cells, and with a few minute glands and glandular hairs. Leaves olive green above, purplish to hoary beneath in the fresh state, hoary on both sides when dry, intensely so beneath; petioles $\frac{1}{5}$–$\frac{3}{10}$ as long as blade; blades ovate to very broadly ovate or broadly trullate-ovate, acute or somewhat acuminate to obtuse, ± cuneate though broadly so at the base, crenate to dentate-crenate with 9–18 pairs of short ± rounded teeth, densely villous especially beneath but without glandular hairs, only the lower surface with glands and these hidden under the indumentum or a few also on the upper surface, 2·5–5 cm long, 1·5–3·5 cm wide, 1–1·7 times as long as wide. Racemes solitary or few, 10–30 cm long; axis with a few minute glands and glandular hairs; verticillasters 10–20-flowered, 7–13 mm apart; bracts ovate to very broadly ovate, loosely pubescent and glandular, 1·5–2·7 mm long; pedicels 2·5–5 mm long. Flowers blue. Calyx 2·3–3·3 mm long. Corolla 7–11 mm long, with glands on all lobes, uppermost and lower lip ± hirtellous; tube deflexed at an angle of 100°–120°, nearly equally wide throughout, nearly straight at the mouth, glabrous; lower lip about as long as tube. Genitalia nearly included. Fruiting calyx 3·5–4·75 mm long; uppermost lobe about half as long, very broadly ovate, acute, ± apiculate or shortly acuminate; lateral lobes a little shorter, falcate-triangular, about 1·7–2 times as long as wide, 0·9–1·1 mm wide; lower lobes up to 0·5 mm longer, narrowly triangular acute, incurved, 0·7–0·9 mm wide, about 2·5–3 times as long as wide. Nutlets nearly circular, 0·8–0·9 mm long, 0·75–0·85 mm wide.—Figs. 2O, 4E, 24, 32.

QUEENSLAND.—COOK DISTRICT: Walsh's Pyramid, 111–150 m, Nov. 1954, *Blake* 19764; Aug. 1959, *Thorne n.s.* (Jan. 1960, *Blake* 21192, Feb. 1962, *Blake* 21678 and seedling of this, Jan. 1963, *Blake* 22009), June 1960, *Jones* (Jan. 1961, *Blake* 21446, Oct. 1962, *Blake* 21966).

P. gratus is known from a single mountain side but the original collections, the plants grown from them, and some self-sown seedlings so well agree and differ so clearly from other species that they must be accepted as representing a distinct species. The flowers are very like those of *P. apreptus* but there are many more in each verticillaster, the habit is definitely shrubby with persistent stems and branches, the indumentum is much denser with longer hairs and the petioles are conspicuously shorter. It is an attractive plant, with a fairly compact habit, dense even indumentum and strongly purplish veins on the lower surface of the younger leaves.

15. Plectranthus spectabilis S. T. Blake, species nova, quoad habitus *P. congestum* R. Br. revocat sed certe fruticosa, villosior, flores pauciores, calyx major lobis pro ratione multo angustioribus; ejus habitus cum structura calycis *P. foetidum* Benth. etiam revocat, sed ab hac pilis antrorsis, pilis glandulosis perraris, dentibus foliorum paucioribus praecipue distinguenda. Typus: Ex planta in monte Macalister Range prope Cairns in Queensland ab Hockings lecta, in Brisbane culta, *Blake* 20535 (BRI.100789); isotypi distribuendi.

Frutex fere inodorus circa 1–1·5 m altus, antrorsum dense ± villosus. Rami ramulique pilis debilibus partim longioribus antrorsis usque ad 1·8 mm longis partim minoribus divaricatis dense pilosi, pilis etiam glandulosis paucis saepissime minimis atque glandulis sessilibus nonnullis praediti.

Folia crassa, subcircularia basi subtruncata vel ± cuneata, dentium paribus 7–12 (–23) crenata vel serrato-crenata, utrinque antrorsum villosa pilis subtus densioribus ibique pilis minimis glandulosis paucis et glandulis sessilibus multis intermixtis, 3·5–11 cm longa, 3·2–7 cm lata, quorum paria 1–3 summa plus distantia minora subsessilia; ceterorum petioli $\frac{1}{6}$–$\frac{1}{2}$ laminae aequantes. Racemi usque ad 11, per paria racemosi vel subpaniculati, 4–18 cm longi; axis pilis longis antrorsis dense pilosus glandulas sessiles dissitas et pilos glandulosos minimos raros etiam gerens; bracteae late ovatae, acutae vel breviter acuminatae, basi attenuatae, 3–6 mm longae; verticillastri 12–20-flori, pro more 2–10 mm distantes, saepius contigui; pedicelli pro more 0·1–2 mm longi. Flores pro maximo parte intense caerulei tubo pallidiores. Calyx 1·8–2·7 mm longus. Corolla 7–10 mm longa; tubus circa medium ad angulum 120°–150° decurvus, glaber vel subtus parce pilosulus, os versus haud vel vix dilatatus; lobi superiores infimusque glandulosi et pilosi, laterales saepe parce pilosi, infimus (labium inferum) tubo paullo brevior. Calyx fructifer 3·5–4·5 mm longus, solum leviter incurvus, villoso-pubescens, ad medium vel paullo ultra lobatus; labium superum anguste subtriangulari-ovatum, acutum et ± acuminatum, 1–1·15 mm latum; lobi laterales huic subaequilongi, suboblique triangulares, acute acuminati, duplo usque ter longiores quam latiores, 0·7–0·9 mm lati; lobi inferiores ceteris longiores angustioresque, longius acuminati, ter usque quater longiores quam latiores, 0·6–0·75 mm lati. Nuculae fere circulares vel ovato-circulares, 0·7–0·9 mm longae, 0·6–0·8 mm latae.—Figg. 2R, 4F, 25, 34.

Shrub about 1–1·5 mm high with hardly any scent. Stems up to 15 mm thick, densely pilose with weak long and short hairs, the shorter (2–) 3–4 (–5)-celled ones divaricate, the abundant longer ones 7–9-celled, antrorse, 1·3–1·8 mm long; a few mostly minute gland-tipped hairs and some sessile 8-celled glands also present. Leaves sage green above, paler or, especially when young, ± purple beneath, thick; petioles mostly $\frac{1}{6}$–$\frac{2}{5}$ (–$\frac{1}{2}$) as long as the blade; blades subcircular to ovate or (when dry) trullate-ovate, obtuse or acute, subtruncate at base to subcuneate or (when dry) decidedly cuneate, rather shallowly crenate-dentate to somewhat serrate with about 7–12 (–23) pairs of short, broad, broadly rounded to subtriangular teeth (sometimes a few with a secondary tooth), rather evenly antrorsely pubescent above, more densely so beneath but the hairs (antrorse) chiefly on the veins, the lower surface also with many small sessile reddish glands and a few minute gland-tipped hairs the latter chiefly on the veins, 3·5–11 cm long, 3·2–7 cm wide, from as long as wide up to 1·8 times as long as wide, the uppermost 1–3 pairs more remote, smaller and subsessile. Racemes up to 11, pedunculate, in pairs along a common pedunculate axis, the peduncles sometimes bearing two racemes, 4–18 cm long or more, about 8–10 mm thick excluding the corollas, covered when young by imbricate, purplish, broadly ovate, acute to shortly acuminate, shortly stipitate, densely hairy and glandular bracts 3–6 mm long and about 2–4·5 mm wide; axis densely long hairy with antrorse hairs, with at most a few minute gland-tipped hairs but with a few scattered sessile glands; verticillasters about 12–20-flowered, 2–10 (–20) mm apart and commonly contiguous; pedicels 0·1–2 (–3·5) mm long with long and short hairs. Flowers predominantly deep blue with a paler tube. Calyx 1·8–2·7 mm long. Corolla 7–10 mm long; tube glabrous or sparsely and shortly pilose on the lower surface, slightly longer than the lobes, decurved about the middle at an angle of 120°–150°; upper lobes pilose and glandular on the back; lateral lobes short, very broadly rounded, glabrous or with a few hairs, eglandular or with a few glands; lower lip rather longer than the upper, glandular and pilose outside. Fruiting calyx 3·5–4·5 mm long, not much incurved, villous-pubescent; upper lip narrowly subtriangular-ovate, acute and ± acuminate, about $\frac{1}{2}$–$\frac{3}{5}$ as long as the calyx, 1–1·5 mm wide; lateral lobes

about as long, 2–3 times as long as wide, somewhat obliquely triangular, acutely acuminate, 1·8–2·3 mm long, 0·7–0·9 mm wide; lowermost longer, narrower, rather long acuminate, 2·2–2·35 mm long, 0·6–0·75 mm wide, 3–4 times as long as wide. Nutlets shining, black or dark brown, nearly circular or ovate-circular, 0·7–0·9 mm long, 0·6–0·8 mm wide.—Figs. 2R, 4F, 25, 34.

QUEENSLAND.—COOK DISTRICT: Mt. Spurgeon, Sept. 1936, *White* 10660; Daintree River in 1875, *Fitzalan;* " Brooklands ", W. of Mt. Molloy, July 1962, *Trapnell n.s.* (Nov. 1962, *Blake* 21977, July 1963, *Blake* 22056); Gadd Gully, Mt. Molloy, July 1960, *Trapnell* 123 *n.s.* (June 1962, *Blake* 21892); Boyle Ck., edge of Hann Tableland, 8 miles NNW. of Mareeba, May 1962, *Webb & Tracey n.s.* (Oct. 1962, *Blake* 21956, July 1963, *Blake* 22057); Macalister Range near source of Hartley Ck., in 1958, *Hockings n.s.* (Springbrook, Apr. 1959, *Hockings*, Brisbane, Feb. 1959, *Blake* 20517, Apr. 1959, *Blake* 20535, Mar. 1960, *Trapnell*, Feb. 1962, *Blake* 21677).

Fitzalan's specimens were referred to *P. foetidus* by F. Mueller, Fragm. 9: 161 (1875) and the species was figured under this name by J. D. Hooker, Bot. Mag. 110: t. 6792 (1884) from plants raised at the Edinburgh Botanic Garden " whence specimens were sent to Kew in 1883 "; it is very likely that these plants were raised from seed from Fitzalan's collection, and specimens from them are in hb. Kew. A large plant in full flower is an impressive sight well deserving Hooker's remark " This very striking plant . . . [is] well worth cultivation ".

P. spectabilis resembles *P. foetidus* in its robust habit, dense indumentum of long white hairs, short petioles, distant, ± reduced upper leaves, relatively short but dense racemes with ± contiguous verticillasters of very shortly pedicellate flowers, with the intensely blue corolla-lobes protruding from the long ± white hairs of bract and calyx, and the narrow calyx-lobes, the upper narrowly ovate; it differs in having very few if any and then mostly minute gland-tipped hairs, all the longer hairs antrorse, fewer leaf-teeth, commonly more numerous racemes, calyx usually shorter in flower and in fruit with firmer shorter and relatively broader lateral and lower lobes, and a corolla with less sharply and, on the whole, less extensively bent tube. Hooker referred the species to sect. *Isodon* because of the " subequal " calyx-lobes but the calyx is 2-lipped with the upper lip formed of the uppermost lobe only, whereas in sect. *Isodon* (= *Rabdosia*) the calyx is either equally 5-toothed or 2-lipped with the upper lip 3-toothed.

16. Plectranthus congestus R. Br. Prodr. 506 (1810). Type: Queensland, Endeavour River, *Banks & Solander* (BM, photo BRI).

Plectranthus australis R. Br. var. *graveolens* (R. Br.) Domin forma *eximius* Domin, Biblioth. Bot. 89: 565 (1928). Type: Queensland, " Beech Mtns., Domin, III. 1910 " actually Cape False, Jan. 1910, *Domin* 8195 (PR, photo BRI).

Perennial herb or subshrub commonly 30–130 cm high or, according to Dallachy, up to 350 cm; roots tuberous. Stems erect or ascending, sometimes shortly creeping at the base, simple or sparsely branched below the inflorescence, shortly pubescent with hairs 0·1–0·3 mm long and with scattered to dense more spreading longer 3–7-celled hairs up to 3 mm long, all hairs ascending, none glandular; glands scattered, small, orange or reddish, 4- or 8-celled. Leaves prominently petiolate below, the uppermost pairs much less so, more distant; petioles mostly $\frac{1}{4}$–$\frac{2}{3}$ as long

as the blade, the uppermost very short; blades very broadly ovate to broadly trullate-ovate or triangular-ovate to narrowly elliptic-ovate, acute to subobtuse, cuneate to subtruncate at base, crenate-dentate nearly to the base with 8–14 pairs of teeth, evenly pubescent on nerves and internerves, more shortly and appressedly so beneath, none of the hairs glandular, sessile glands abundant on lower surface, few or none on the upper surface, 2·5–8·5 cm long, 1·3–6 cm wide, 1–2·3 times as long as wide, nerves impressed above, but not strongly so, much raised beneath, upper surface lightly rugose, some of the reticulations conspicuous on both sides in the dry state. Racemes commonly several to many, ± paniculate, about 10–50 cm long, rarely few or solitary; axis with very few minute glandular hairs and scattered glands; bracts ovate to transversely ovate, acute or the broader ones obtuse, 1·2–2·5 mm long, a few of the lower ones sometimes leafy; verticillasters 4–12 mm apart with commonly 20–50 flowers; pedicels 1–5 mm long. Flowers predominantly blue or deep blue. Calyx 1–1·6 mm long, hirtellous and glandular. Corolla 4–11 mm long; tube sparsely hirtellous, deflexed a little below the middle at an angle of about 120°–130°, oblique at the mouth; uppermost lobes and lower lip hirtellous and glandular, the latter about as long as the tube, lateral lobes sometimes glandular. Fruiting calyx 2–3 mm long; upper lip about half as long, subcircular or very broadly ovate, somewhat apiculate, sometimes broader than long; lateral lobes obliquely triangular falcate, acute, 0·8–0·9 mm wide, about 1·3–1·4 times as long as wide; lower lobes as long or slightly longer, narrowly and obliquely subtriangular, acute, incurved, 0·5–0·6 mm wide, about twice as long as wide. Nutlets nearly circular, 0·65–0·85 mm long, 0·55–0·75 mm wide.—Figs. 2S, 4G, 26, 36.

TIMOR.—PORTUGUESE TIMOR: Between Laclo and Samoro, May 1883, *Forbes* 3888. INDONESIAN TIMOR: Near Kupang, Apr. 1803, *R. Brown.*

NEW GUINEA.—PAPUA: Central Division: Above Rouna Falls, Mar. 1959, *Womersley & Brass in NGF.* 11010; Rona, Laloki River, Mar. 1933, *Brass* 3578; Toulon Island, Nov. 1930, *Turner;* Kuaipo and Animarupu near Kerepunn, *Chalmers.* Eastern Division: Misima I. (Louisiade Archipelago), Narian, Aug. 1956, *Brass* 27602.

WESTERN AUSTRALIA.—NORTHERN PROVINCE: Isdell River, June 1905, *Fitzgerald* 1053.

QUEENSLAND.—COOK DISTRICT: Coen, on Silver Plains Station, July 1963, *Wassell;* Isabella Falls, June 1962, *Stephens;* Endeavour River, in 1770, *Banks & Solander*, in 1819, *Cunningham* 210/1819, in 1882, *Persieh* 488, in 1886, *Persieh* 750; Maytown, June 1880, *Wycliffe* 86; Walsh River, May 1891, *Barclay Millar;* Walsh Range, *Burton;* Geraldine Falls, Mt. Mulligan, Apr. 1934, *Flecker*?; Mt. Fraser, 450 m, Apr. 1932, *Brass* 2542; Mt. Spider near Mareeba, Apr. 1961, *Goodall* (June 1962, *Blake* 21891); Gorge Ck., near Mareeba, Apr. 1962, *McKee* 9267; near Mareeba, Apr. 1962, *McKee* 9452 (Apr. 1963, *Blake* 22037), 482 m, Aug. 1963, *Blake* 22092; Davies Ck., ± E. of Mareeba, May 1960, *Jones* (Apr. 1961, *Blake* 21472, 21489, May 1961, *Blake* 21493, Apr. 1963, *Blake* 22035); Davies Ck., Lamb Range, ± 750 m, June 1967, *Brass* 33573; Barron River, *Bailey;* Cape False, Jan. 1910, *Domin* 8195; Stannary Hills, *Bancroft.* NORTH KENNEDY DISTRICT: W. of Herberton, crest of Great Dividing Range, 1000 m, Aug. 1963, *Blake* 22109; Millstream Falls, July 1960, *Trapnell* 249 (Jan. 1961, *Blake* 21443), July 1961, *Salmon n.s.* (Apr. 1963, *Blake* 22036); Rockingham Bay, *Dallachy;* Cashmere, *Armit* 215; Herbert River, June 1864 and June 1866, *Dallachy*, in 1889, *Lamont;* 5 miles S. of " Wairuna ", June 1967, *Morain* 032.

The statement that *P. congestus* occurs in New South Wales (Maiden & Betche, Proc. Linn. Soc. N.S.W. 24: 149 (1899), Census N.S.W. Pl. 178 (1916)) is based on the misidentification of a specimen of *P. graveolens.*

Domin cited only " Beech Mts." (now Beechmont) in the protologue of *P. australis* var. *graveolens* f. *eximius*, but I have seen no specimen of his from this locality or with this name. His account of the specimen does not agree with any material seen from southern Queensland, but it does agree very well with one of his specimens from Cape False now numbered 8195 with the name *Plectranthus australis* R. Br. var. *graveolens* (R. Br.) Domin. This specimen is of the northern *P. congestus*, so it must be assumed that there is a mistake in the published account; it differs from the average in having abundant long hairs up to 3 mm on the internodes and petioles, some leaves as wide or even wider than long (most are too imperfect for measurement) and slightly larger fruiting calyx.

Plectranthus congestus is readily distinguished by the usually many- and dense-flowered verticillasters with mostly short pedicels and the small calyx (in flower or fruit) with the lower lobes almost as broad as the relatively broad lateral lobes. The corolla is hardly to be distinguished from that of *P. parviflorus* and the leaves are also much like those of this species except for the usually more numerous teeth. Well grown specimens are much taller than the plants of most other Australian species, the greater part of each stem being occupied by a large leafy panicle of racemes. Gland-tipped hairs are very rare even in the inflorescence, and quite minute. The sessile glands are mostly 4-celled on the stem, leaves and axis, 8-celled on the flowers, variable (and few) on the pedicels. Verticillasters with flowers as few as 10 occur on *Blake* 21472; *McKee* 9452 from stunted bushy plants not above 20 cm high with some flowering stems only 10 cm high, small leaves up to 2 cm long with only 4–7 pairs of teeth and solitary racemes 3–6 cm long has 6-flowered verticillasters, but in cultivation some of this material produced average plants (*Blake* 22037). Whitehouse's two collections also have leaves with only 4–7 pairs of teeth but with unusually long pedicels 4–6 mm long in the 10–15-flowered verticillasters; they appear to be from quite young plants.

Of the collections from Timor, *Forbes* 3888 is from a well grown very hairy plant and was referred by Forbes to *P. parviflorus* in A Naturalist's Wanderings in the Eastern Archipelago 514 (1885), while R. Brown's meagre material on " walls etc. near the town " is sparsely shortly hairy with few-flowered verticillasters, apparently from weak plants. Keng, Gard. Bull. Sing. 24: 143 (1969) referred *Forbes* 3888 to *P. javanicus* (Bl.) Benth. (*Rabdosia javanica* (Bl.) Hassk.) and to *P. parviflorus* on p. 150; on p. 151 he referred Brown's specimens to *P. klossii*.

17. Plectranthus petraeus Backer ex Adelbert, Reinwardtia 3: 152, Fig. 3 (1954). Type: Java, Idjin Plateau, Sempol, *Backer* 36387 (L; L.947.85–176, holotype (not seen); –174, –175, isotypes; photo –175, BRI).

" Herb or suffrutex, 1–1·5 m high, very fragrant." Stems apparently not much branched, up to at least 10 mm thick at base, ascending, retrorsely densely and minutely pubescent with hairs about 0·1–0·2 mm long and also ± hirsute with retrorse hairs up to 1·5 mm long with up to 7 cells; no glands or gland-tipped hairs. Leaves with petioles about $\frac{1}{8}$–$\frac{1}{3}$ as long as the blade, 3–24 mm long; blades ovate to narrowly ovate, acute and ± acuminate, ± cuneate at base sometimes broadly so, serrate-crenate with about 10–17 pairs of teeth, many of them with a secondary tooth, ±

woolly on both sides also with abundant minute gland-tipped hairs, with or without glands, the hairs less dense on the veins on the upper surface, the indumentum sometimes sparser on the larger leaves, about 2·2–10 cm long and 1·5–7 cm wide, about 1·5–3 times as long as wide. Racemes ± woolly or pubescent, numerous (up to 19), more or less paniculate, about 3·5–10 cm long; main axis 3–5-noded, together with the axis of the individual racemes retrorsely woolly like the leaves with a very few exceedingly minute gland-tipped hairs (less than 0·02 mm long) and no glands; verticillasters 10–14-flowered, contiguous upwards, the lower ones up to 15 mm apart; bracts ± broadly to ± narrowly ovate, shortly acuminate, ± rounded to attenuate at base, villous outside and with a few minute gland-tipped hairs but no glands, 2·5–4·5 mm long, 1·8–3 mm wide; pedicels 1·8–6·5 mm long. Flowers about 4·5–7 mm long. Calyx 2–2·5 mm long. Corolla antrorsely pubescent on tube and lobes; tube about funnel-shaped and decurved, not at all sigmoid, subcylindrical in the lower part, then much wider, the lower surface gently decurved from a little above the base, the upper side following the same direction to near the middle and then diverging to the very broad mouth; upper lobes ovate-circular; lateral ones antrorse, obliquely ovate, rounded; lower lip slightly longer than the tube, somewhat spathulate-obovate. Fruiting calyx 3·5–5 mm long, incurved, woolly to hirtellous with no gland-tipped hairs and few glands, divided to about the middle; upper lip somewhat narrowly to somewhat broadly ovate, acute, about as long as the tube, 0·9–1·2 mm wide; lateral lobes falcate-triangular, acute, about as long, and nearly or quite as wide (0·8–1·1 mm wide), about twice as long as wide; lower lobes the longest, narrowly triangular, acute, upcurved, 0·55–0·65 mm wide, about 3·5–4 times as long as wide. Nutlets brown, broadly elliptic to broadly ovate-elliptic, 0·8–1 mm long, 0·65–0·85 mm wide.—Figs. 2N, 4H, 27, 36.

JAVA.—PASURUAN: near Ngadisari, 2000 m, Oct. 1899, *Koorders* 37615β. BESUKI: Idjen plateau, ridge of Redjengan, Sempol, 1100 m, June 1927, *Backer* 36387, June 1918, *Backer* 25002, Apr. 1940, *van Steenis* 12008; Idjen plateau, Nov. 1893, *Koorders* 13560β ; N. slope of Mt. Idjen above Bajeman, 150–600 m, Apr. 1920, *Backer* 30788.

Frequent to very common on rocks.

P. petraeus resembles *P. spectabilis* in the paniculate racemes having partly contiguous verticillasters with short pedicels while the structure of the fruiting calyx also recalls that of *P. spectabilis*, but the upper leaves are not greatly reduced or distant, all leaves are narrower, the hairs on the stem are retrorse and those elsewhere are more woolly, glands are sometimes absent, and the form of the corolla is very different from that of any other species I have seen. The double ± stigmoid bending of the tube so evident in the Australian species is at best only " indicated "; the basal part is about straight and cylindrical; there is a weak bend in the upper surface below the middle and shortly above a return almost to the direction below, but the lower surface is almost continuously decurved from a little above the base. The upper and lateral lobes are much like those of the Australian species and I do not find the ± deltoid lateral lobes described and figured in the protologue; the lower lip is more gradually narrowed to the base than in the other species dealt with here. The inflorescence also recalls that of *P. congestus* but is often more woolly especially when young, and the general habit may be much the same, but these two species

are otherwise very different. There is some resemblance to *P. klossii* in the corolla because of the weak bends in the latter and also in the indumentum, but the latter looks very different because of the few (1–3) racemes with more distant, fewer-flowered verticillasters and differs further in the presence of gland-tipped hairs on the axis, the abundance of glands on the leaves, and the broader upper lip of the calyx. The available material is not satisfying and may not give an adequate idea of the species.

Koorders 37615 was cited by Koorders as *Plectranthus* ? spec. indet. in Natuurk. Tijdschr. Nederl. Ind. 62: 218 (1903) and later (Sept. 1908 *in sched.*) he determined it as *P. intermedius* Zoll. & Mor. but did not cite this number under this name in Exkursionsfl. Java 2: 155 (1912). This collection with some old fruiting calyces and *Backer* 30788, just coming into flower, are very much less woolly than the others, merely closely pubescent in the inflorescence.

P. petraeus is the only species certainly known to occur between the Asiatic mainland and Timor. *P. leschenaultii* Benth. Lab. Gen. & Sp. 24 (1832) based on a Leschenault specimen (P) from Java is a species of *Coleus* (*Solenostemon*).

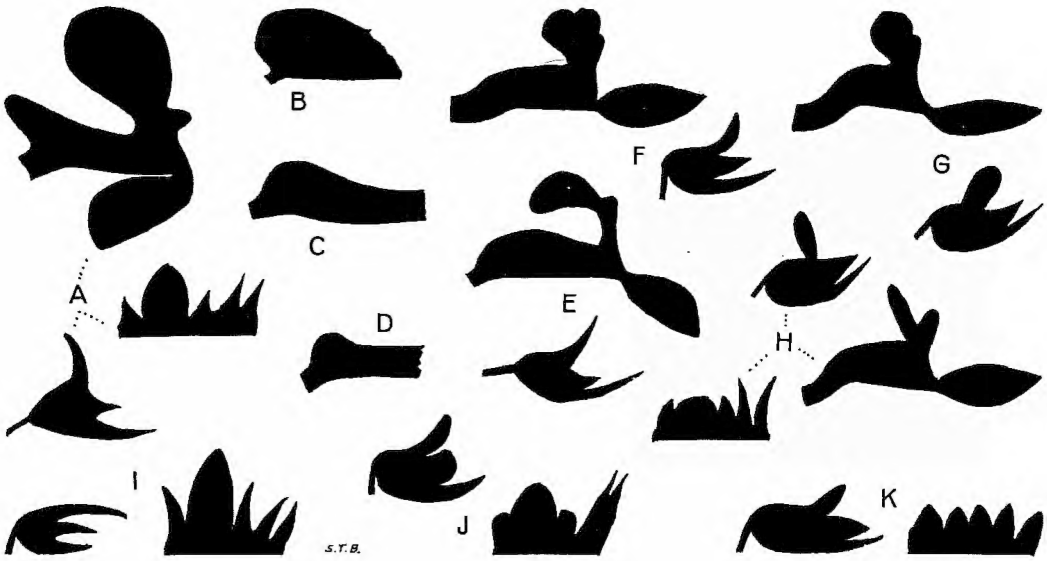
EXCLUDED SPECIES

Plectranthus

apoensis (Elm.) H. Keng ..	Coleus apoensis *Elm.* (Solenostemon)
benthamianus Miq.	Rabdosia
bicolor Bl.	Coleus (Solenostemon)
diffusus Merr.	Rabdosia
galeatus Vahl	Coleus galeatus (*Vahl*) *Benth.* (Solenostemon)
ingratus Bl.	Coleus (Solenostemon)
intermedius Zoll. & Mor. ..	Rabdosia
javanicus (Bl.) Benth. ..	Rabdosia javanica (*Bl.*) *Hassk.*
laciniatus Bl.	Coleus (Solenostemon)
leschenaultii Benth.	Coleus (Solenostemon)
longicornis F. Muell.	Ceratanthus longicornis (*F. Muell.*) *G. Taylor*
macrophyllus Bl.	Coleus (Solenostemon)
micranthus Spreng. non Chiov.	Basilicum polystachyon (*L.*) *Moench*
moschatus R. Br.	Basilicum
parviflorus R. Br. non Willd.	Basilicum polystachyon (*L.*) *Moench*
rufescens Benth.	Rabdosia
scutellarioides (L.) R. Br. ..	Coleus scutellarioides (*L.*) *Benth.* (Solenostemon)
steenisii H. Keng	Rabdosia
teysmannii Miq.	Rabdosia
tuberosus Bl.	Coleus (Solenostemon)
zollingeri Briq.	Rabdosia

FIG. 1. Silhouettes of corolla (tube only at B, C, D), calyx, and flattened-out calyx-lobes of some species of *Plectranthus* and allied genera. A, *Plectranthus fruticosus;* B, *P. saccatus;* C, *P. oertendahlii;* D, *P. ciliatus;* E, *P. verticillatus;* F, *P. draconis;* G, *P. zeylanicus* (*P. tomentosus*); H, *P. parviflorus;* I, *Coleus amboinicus;* J, *Coleus scutellarioides;* K, *Rabdosia javanica.* Figures not to scale with indumentum omitted. Explanation in the text (p. 11).

FIG. 2. Variation in indumentum on stems. A, 4- and 8-celled sessile glands (bladder hairs) seen from the top and (at left) from the side, about 75 ×. B–S, hairs shown as though on a vertical section of the stem, × 25, but with no attempt to show frequency; longer hairs ± retrorse from B to N, ± antrorse from O to S; divaricate gland-tipped hairs from B to D and I to M; minute gland-tipped hairs regarded as of no diagnostic value at K, M, P and R but sometimes present on other species; sessile glands shown in solid black at F, G, H, L, O, Q, and S. Figures from living or soaked-out material with a withered hair and a degenerated hair at x and y; mostly from plants from which Figs. 3 and 4 were drawn. In some species there is considerable variation in the length of the longer hairs, an extreme case being shown at B (*Gressitt* 2304) and C (*Brass* 11555). B, C, *P. klossii;* D, *P. foetidus;* E, *P. parviflorus;* F, *P. argentatus;* G, *P. amicorum;* H, *P. alloplectus;* I, *P. suaveolens;* J, *P. graveolens;* K, *P. diversus;* L, *P. intraterraneus;* M, *P. mirus;* N, *P. petraeus;* O, *P. gratus;* P, *P. apreptus;* Q, *P. forsteri;* R, *P. spectabilis;* S, *P. congestus.*


A
B
C
D
E
F
G
H
I
J
K
S.T.B.

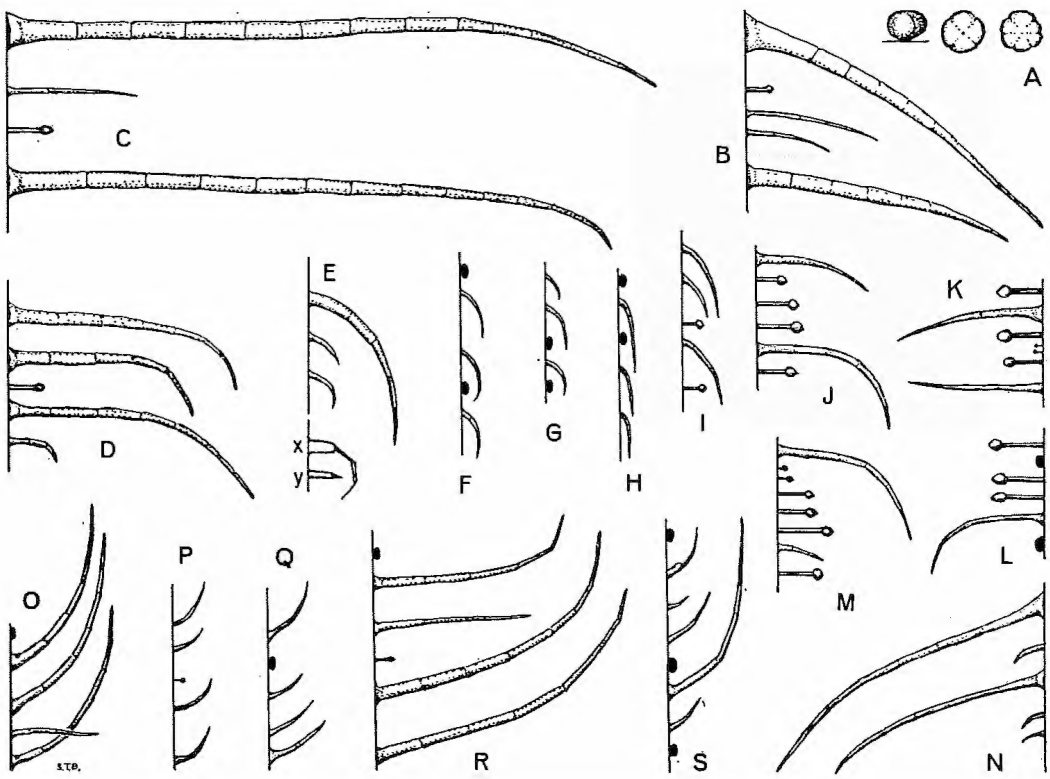

A
B
C
D
E
x
y
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
S.T.B.

FIG. 3. Floral characters of *Plectranthus* spp., Nos. 1–9 (see also Fig. 4): corolla (as at c), flowering calyx (as at f), fruiting calyx (as at k), and fruiting calyx split open and flattened out with indumentum removed (as at s); all × 4. The direction of the upper lip of the corolla and fruiting calyx changes with age and no diagnostic importance should be placed on it. A, *P. graveolens* (Blake 19805); B, *P. diversus* (Blake 22128); C, *P. mirus* (Blake 21791); D, *P. foetidus* (Blake 21790); E, *P. amicorum* (Blake 22094); F, *P. argentatus* (Blake 21195); G, *P. alloplectus* (Blake 21703); H, *P. suaveolens* (Blake 20506); I, *P. klossii* (Brass 11555).

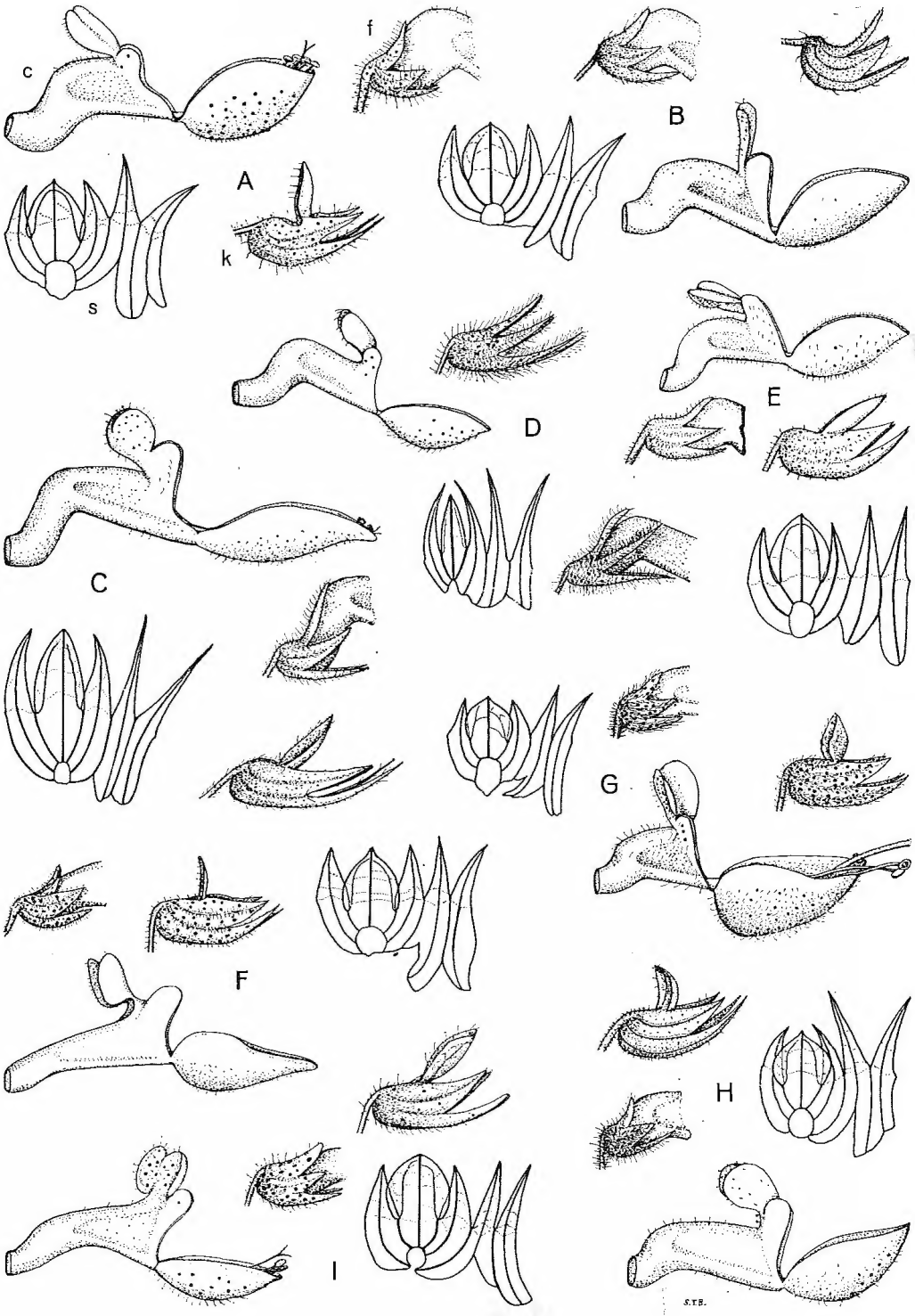

c
f
B
A
k
s
D
E
C
F
G
H
I

FIG. 4. Floral characters of *Plectranthus* continued from Fig. 3; spp. Nos. 10–17. A, *P. intraterraneus* (Blake 20193); B, *P. parviflorus* (Blake 21950; x, cleistogamous flower; y, same in section; z, its corolla); C, *P. forsteri* (Eromanga, MacGillivray); D, *P. apreptus* (Blake 21730); E, *P. gratus* (Blake 21192); F, *P. spectabilis* (Blake 20535); G, *P. congestus* (Blake 21443); H, *P. petraeus* (van Steenis 12006).

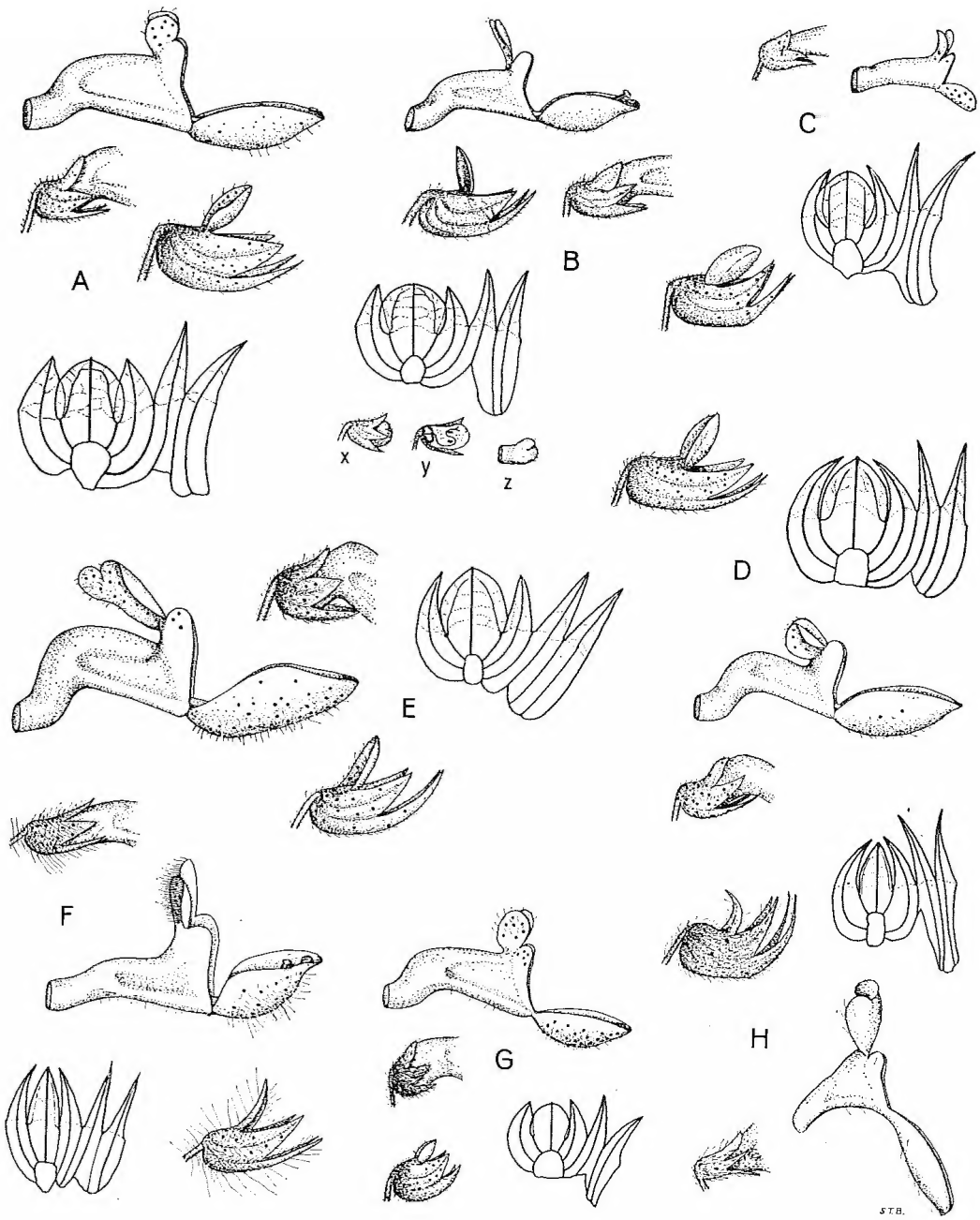

A
B
C
x
y
z
D
E
F
G
H
STB.

FIG. 5. *Plectranthus* spp. in their native habitat (A, B, D, F) and in cultivation (C, E; see also Fig. 6B). A, *P. mirus;* B, C, *P. argentatus;* D, E, *P. foetidus;* F, *P. graveolens.* A, at White Cliff Point (type); B, at type locality; C, from type material; D, at Edge Hill (Blake 21790); E, from Blake 21750; F, at Mt Roberts (Blake 19805 from this community).

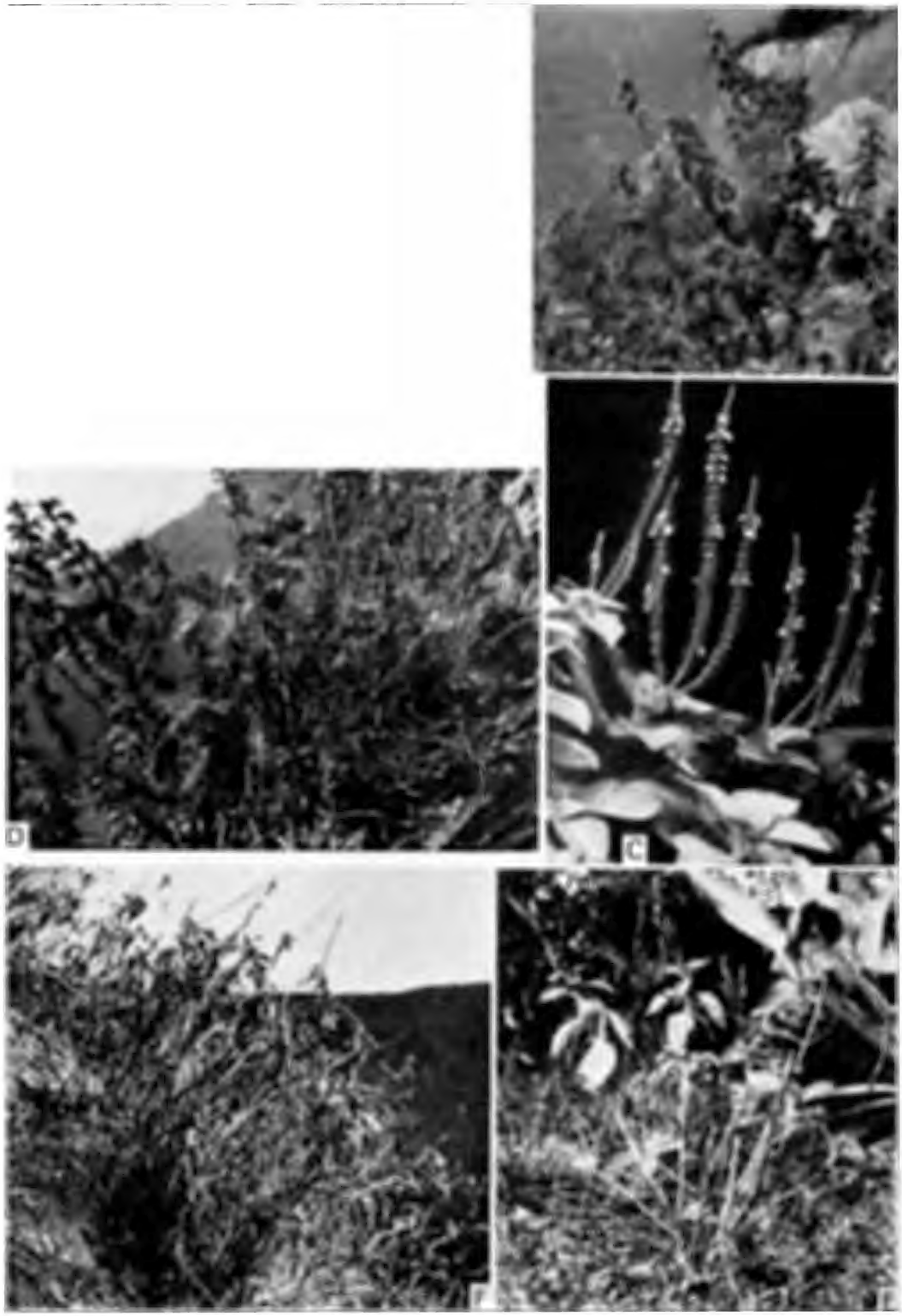


FIG. 6. *Plectranthus graveolens;* A, from same plant as Blake 20350; B, plant in cultivation from Mt. Mitchell, *Clifford* (from colour transparency).


¼cm
2 cm
A


B

FIG. 7. *Plectranthus graveolens,* syntypes (BM), lectotype at left. Photographed by the British Museum (Nat. Hist.) Studio; published by permission of the Trustees of the British Museum (Nat. Hist.).


R. Brown, Iter Australiense, 1802–5.
No. 2345
HERB MUSEI BRITANNICI
LECTOTYPE SPECIMEN
Plectranthus graveolens
R. Br., Prodr. 506 (1810)

FIG. 8. *Plectranthus diversus* (Blake 22128).

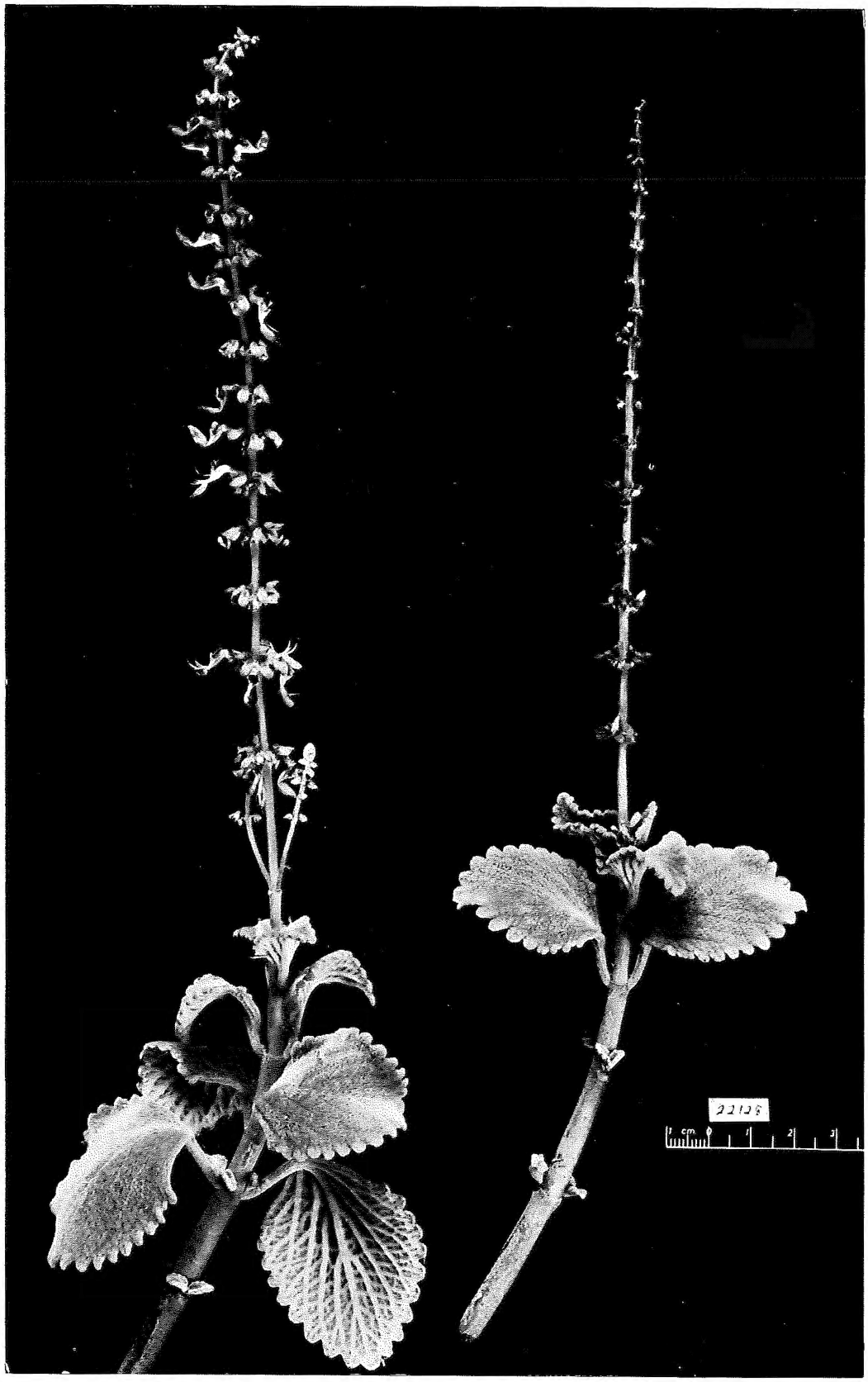

22128
cm 0 1 2 3

FIG. 9. *Plectranthus mirus* (Blake 22133).

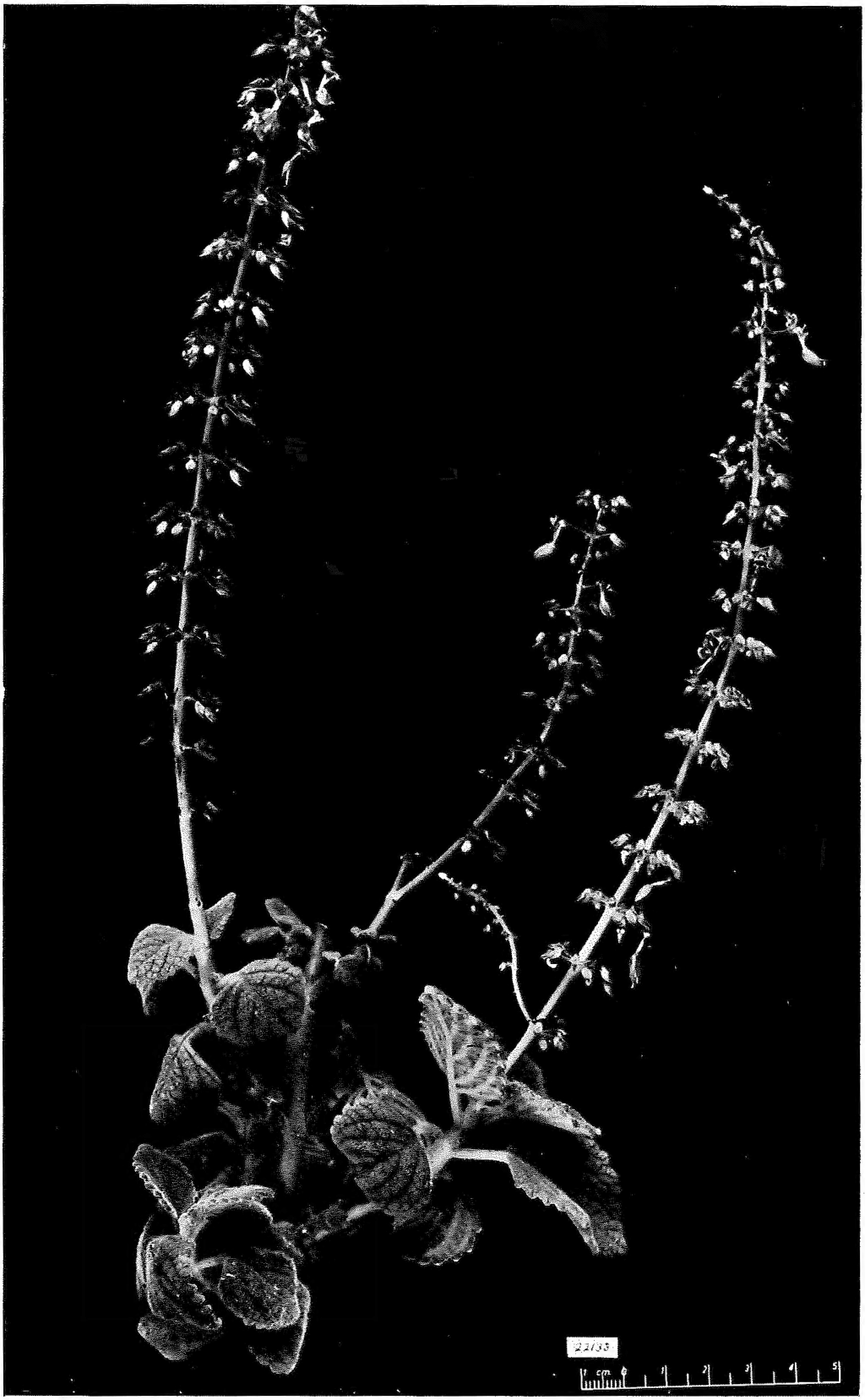

22133
cm 0 1 2 3 4 5

FIG. 10. *Plectranthus foetidus* (Blake 22044 and 23554).


23554

FIG. 11. *Plectranthus foetidus,* holotype (BM). Photographed by the British Museum (Nat. Hist.) Studio; published by permission of the Trustees of the British Museum (Nat. Hist.).

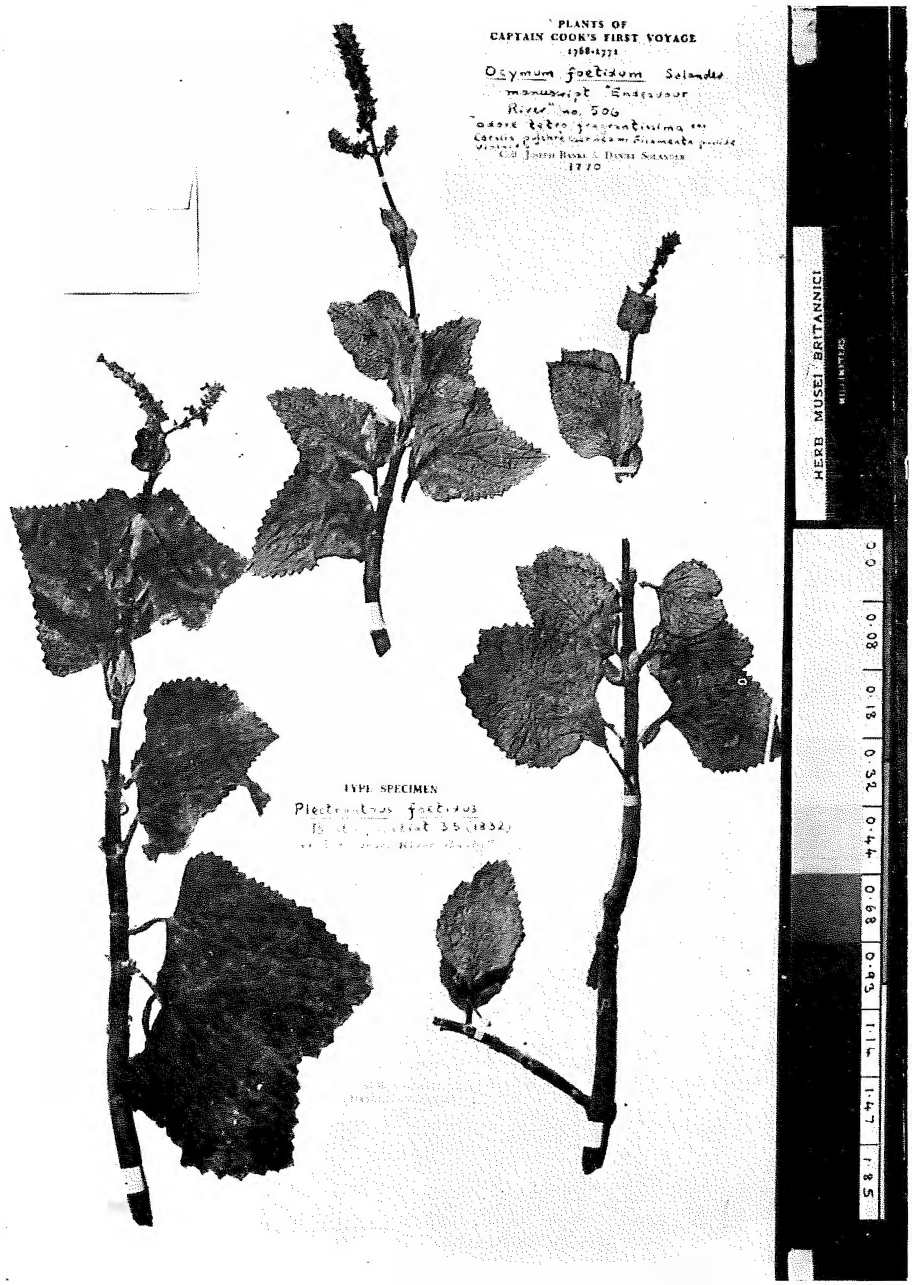

PLANTS OF
CAPTAIN COOK'S FIRST VOYAGE
1768-1771
Ocymum foetidum Solander
manuscript "Endeavour
River" no. 506
1770
TYPE SPECIMEN
HERB. MUSEI BRITANNICI

FIG. 12. *Plectranthus amicorum* (Blake 23552).

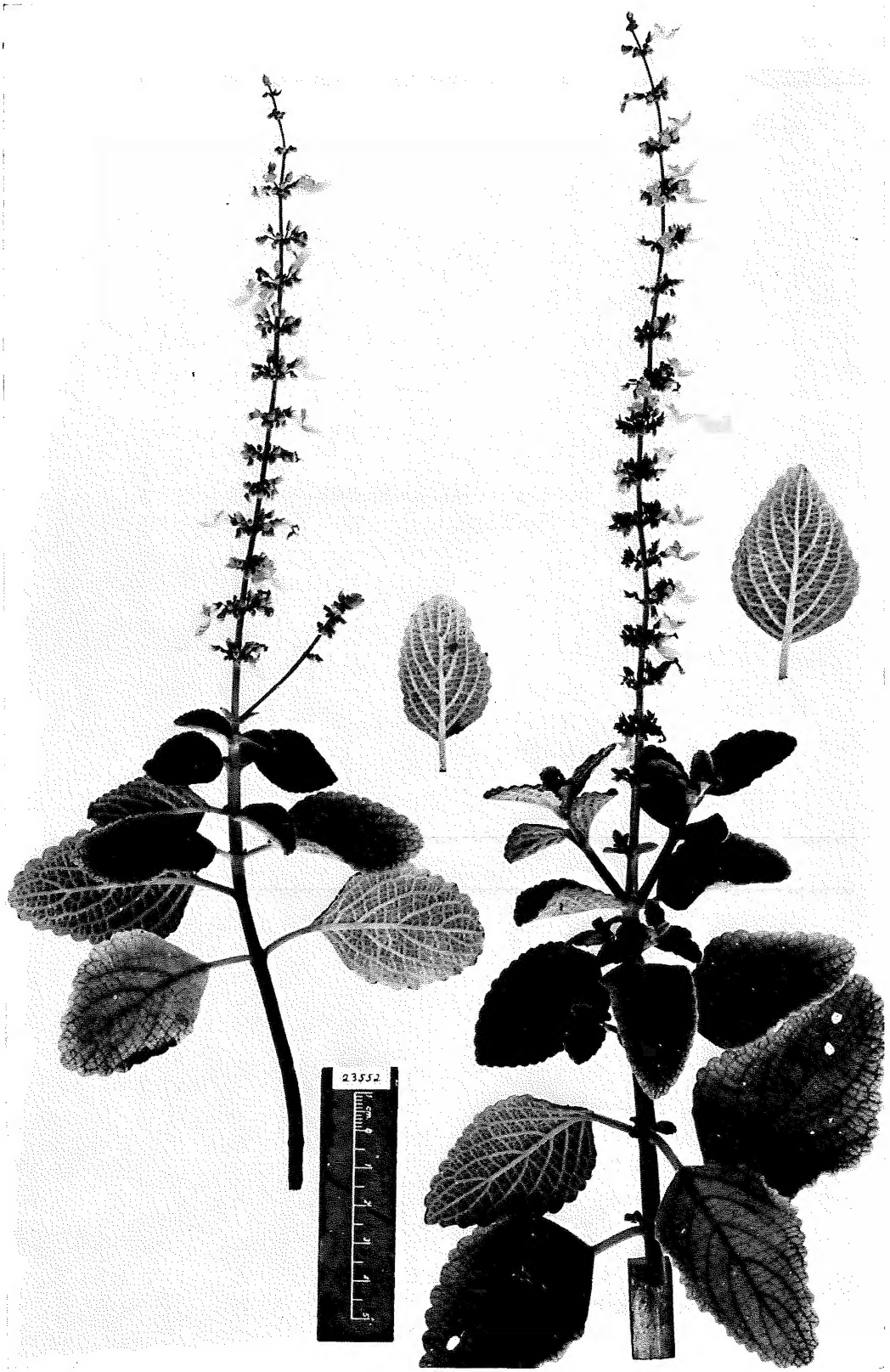

23552

FIG. 13. *Plectranthus argentatus* (from same plant as Blake 21195, etc.).


RS
2 cm
2 mm

Fig. 14. *Plectranthus alloplectus* (Blake 22046).

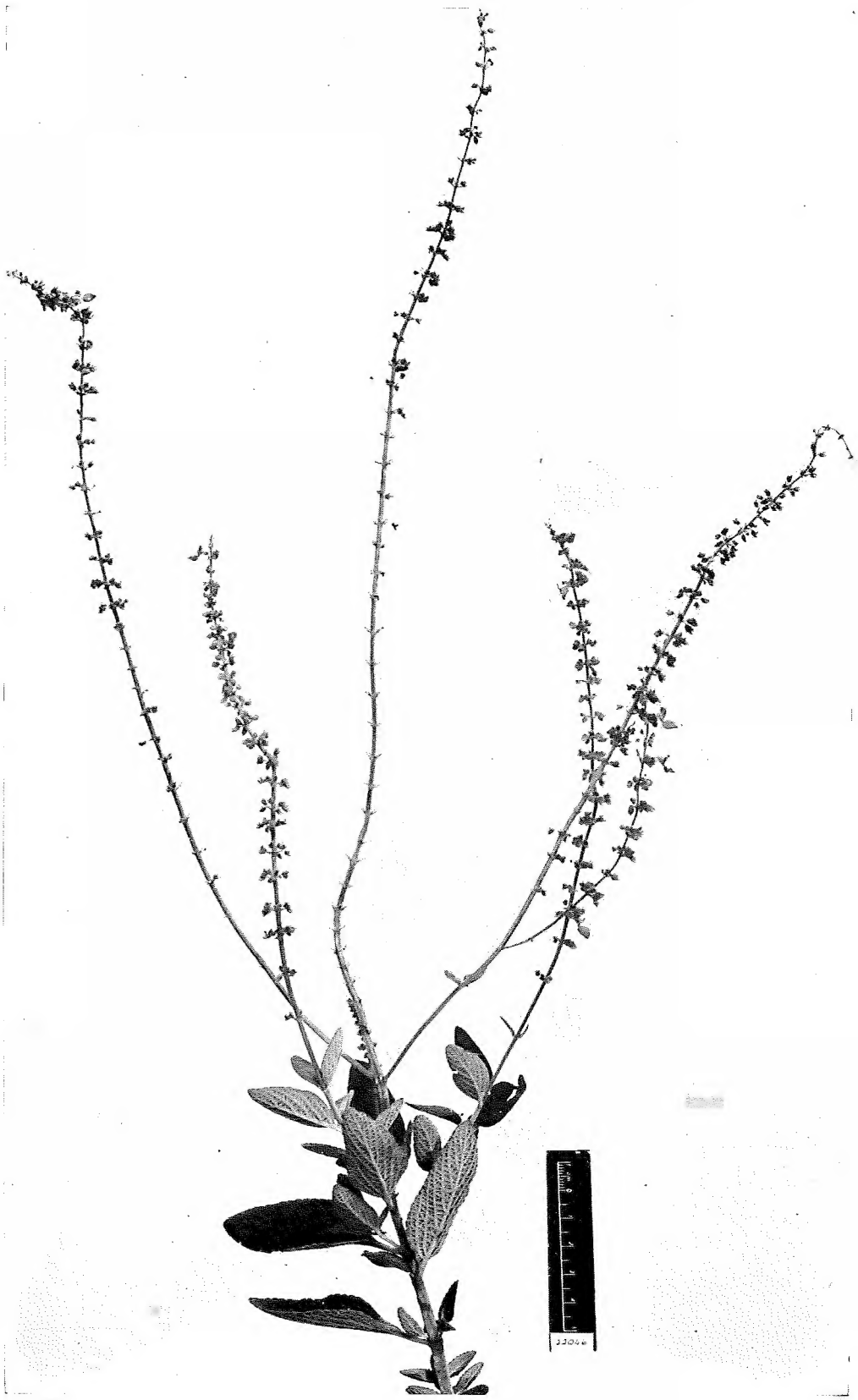


FIG. 15. *Plectranthus suaveolens* (from same plant as Blake 20506).

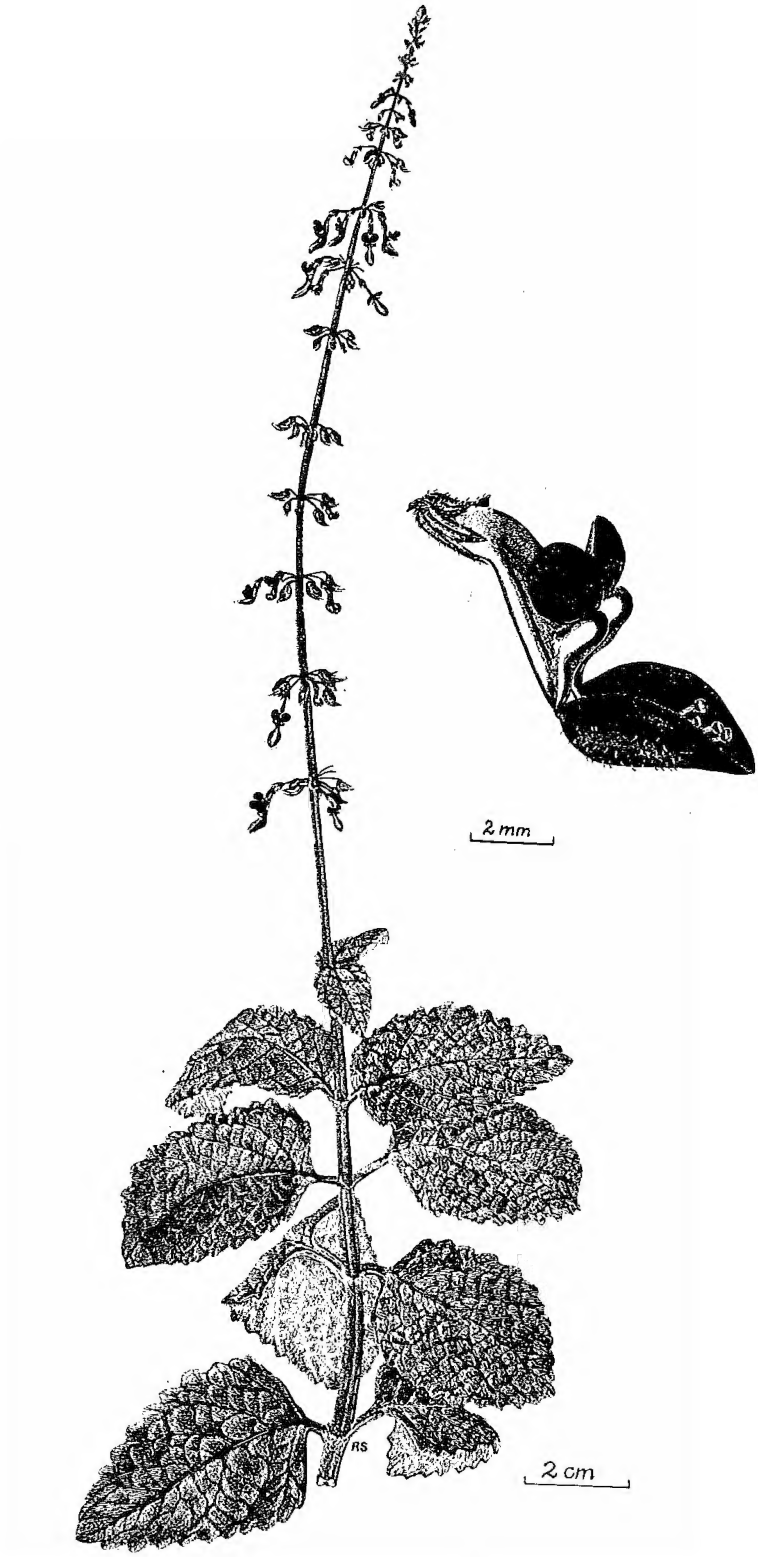

2 mm
RS
2 cm

FIG. 16. *Plectranthus klossii.* A, Gressitt 2304; B Brass 11555. Note different scales.

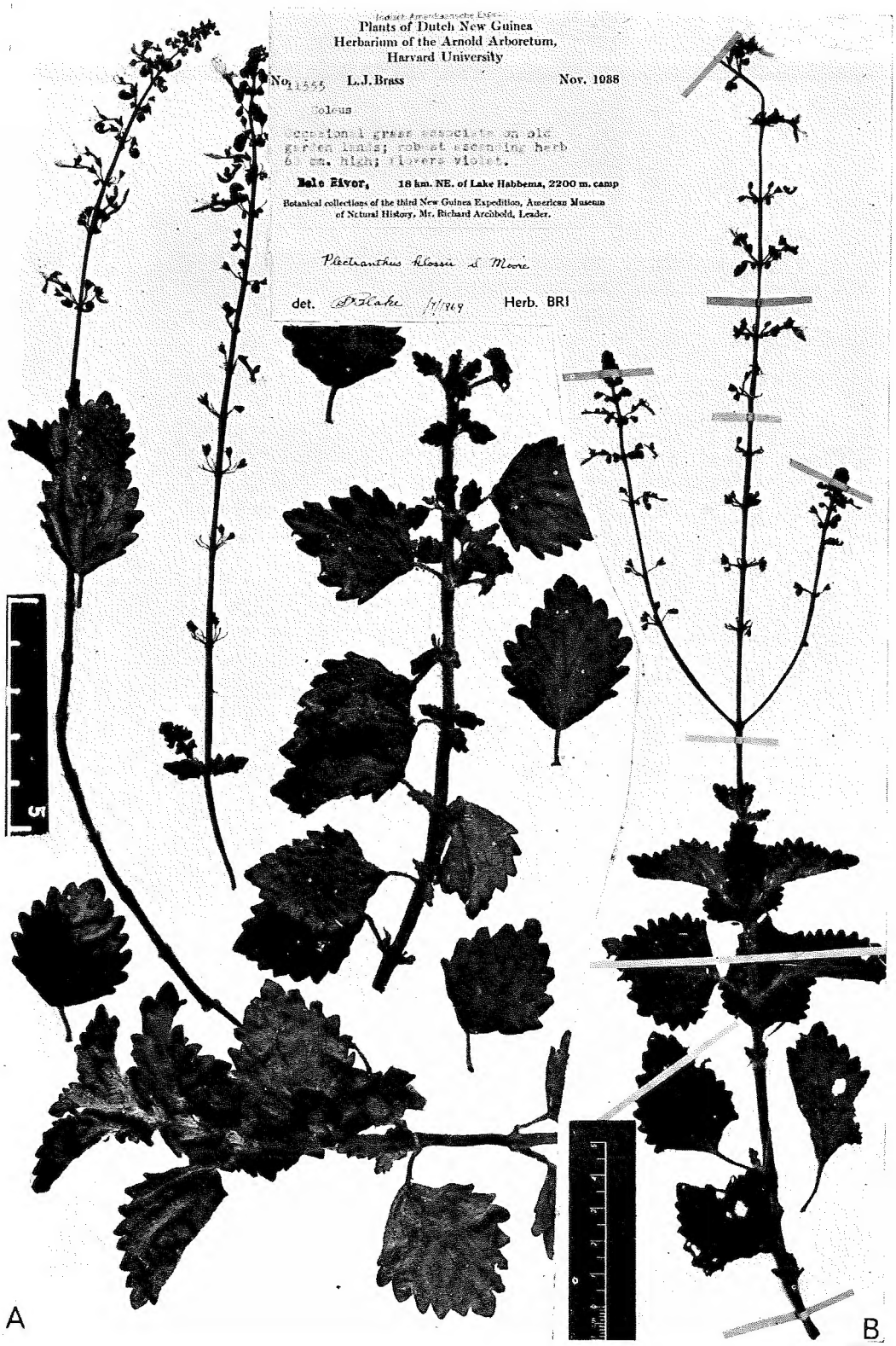

Plants of Dutch New Guinea
Herbarium of the Arnold Arboretum,
Harvard University
No. 11555 L.J. Brass Nov. 1988
Coleus
Bele River, 18 km. NE. of Lake Habbema, 2200 m. camp
Botanical collections of the third New Guinea Expedition, American Museum of Natural History, Mr. Richard Archbold, Leader.
Plectranthus klossii S. Moore
det. B.J. Lake 1/1989 Herb. BRI
A
B

FIG. 17. A–C, *Plectranthus klossii.* A, B, holotype; C, holotype of *P. klossii* var. *major.* D, *P. forsteri,* holotype. A, C, D reduced to same scale. Photographed by the British Museum (Nat. Hist.) Studio; published by permission of the Trustees of the British Museum (Nat. Hist.).

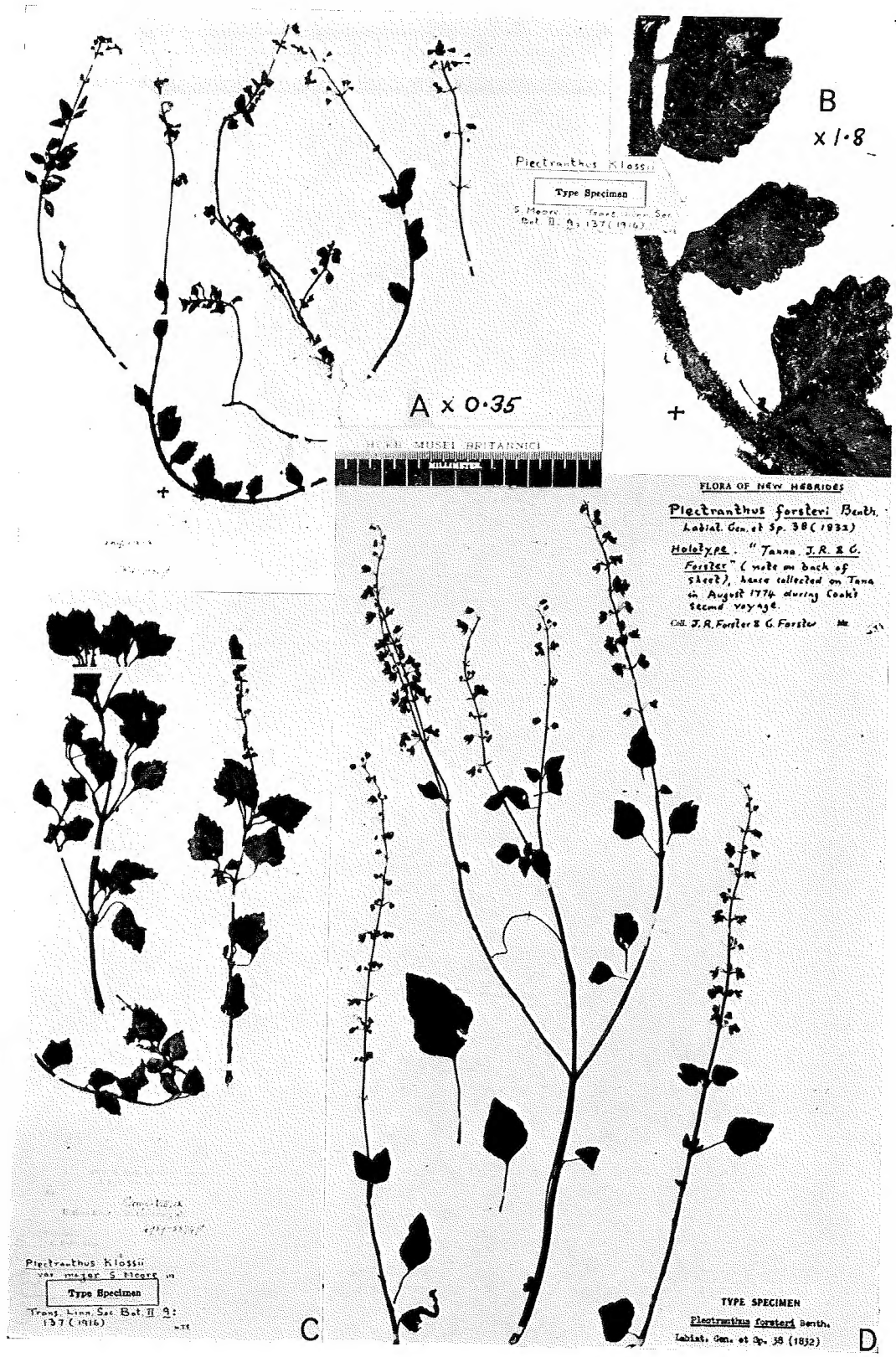

A x 0·35
B
x 1·8
Plectranthus Klossii
Type Specimen
S. Moore Trans. Linn. Soc. Bot. II. 9: 137 (1916)
FLORA OF NEW HEBRIDES
Plectranthus forsteri Benth.
Labiat. Gen. et Sp. 38 (1832)
Holotype. "Tanna. J.R. & G. Forster" (note on back of sheet), hence collected on Tana in August 1774 during Cook's second voyage.
Coll. J.R. Forster & G. Forster
Plectranthus Klossii
var. major S. Moore
Type Specimen
Trans. Linn. Soc. Bot. II 9: 137 (1916)
C
TYPE SPECIMEN
Plectranthus forsteri Benth.
Labiat. Gen. et Sp. 38 (1832)
D

FIG. 18. *Plectranthus intraterraneus* (Blake 20193).


¼ cm
2 cm
RS

FIG. 19. *Plectranthus parviflorus,* young plants (Blake 21950).

D

FIG. 20. *Plectranthus parviflorus* (Blake 20074).

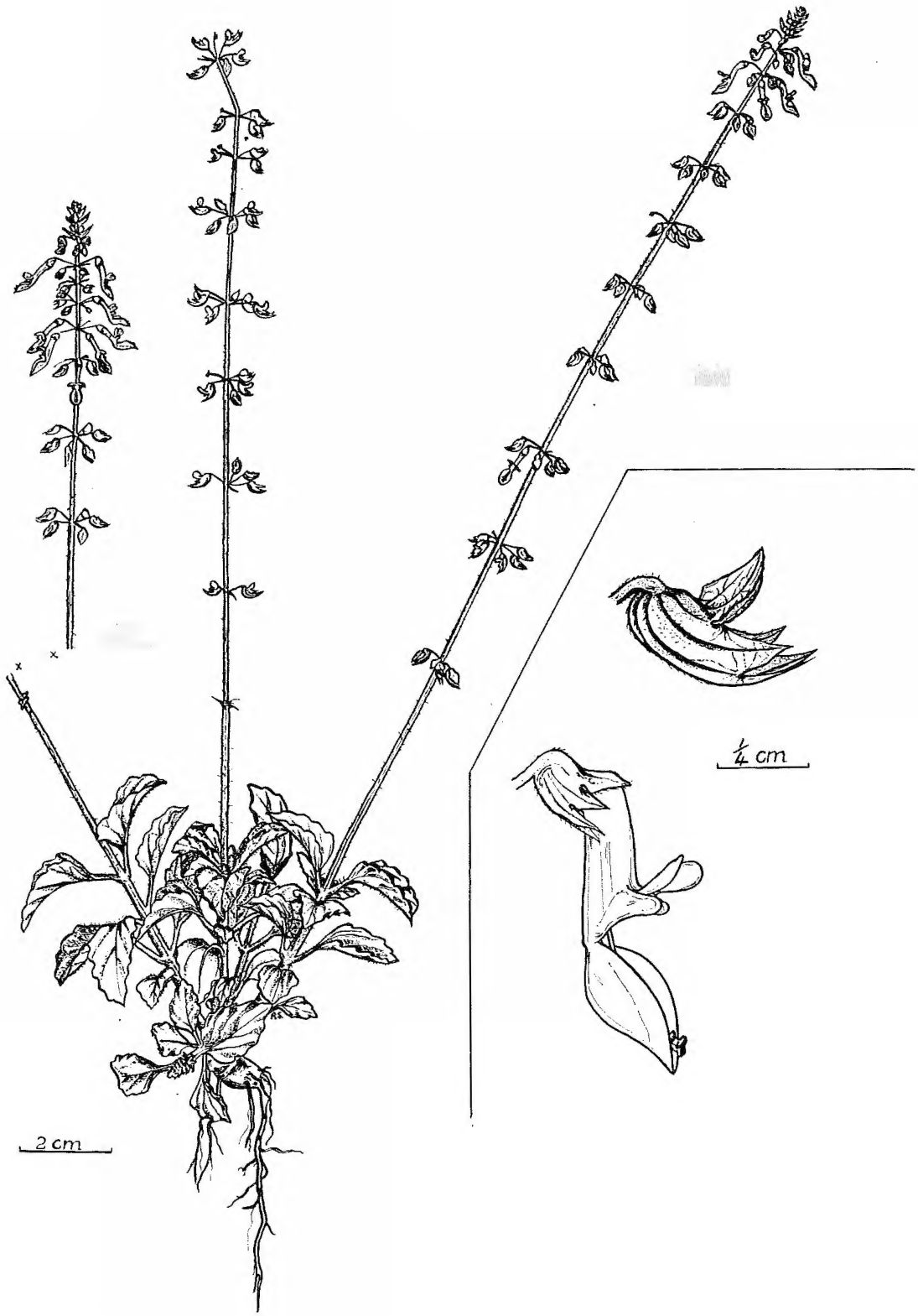

2 cm
¼ cm

FIG. 21. *Plectranthus parviflorus.* A, holotype of *P. parviflorus* Willd. (B) photographed in hb. Berlin (Botanischer Garten und Botanisches Museum Berlin-Dahlem) and published by permission of the Director. B, lectotype of *P. australis* R. Br. (BM), photographed by the British Museum (Nat. Hist.) Studio; published by permission of the Trustees of the British Museum (Nat. Hist.). Note different scales.

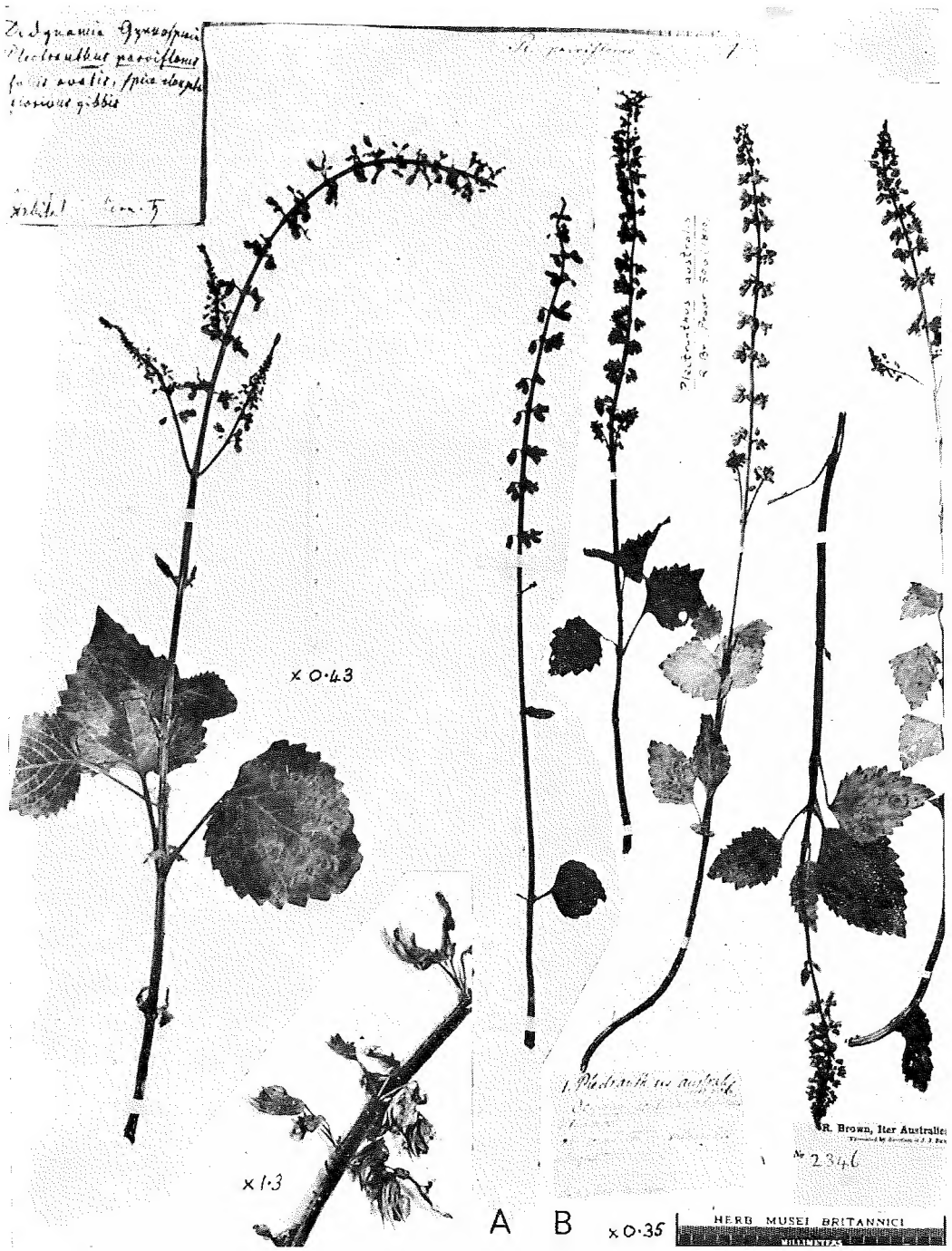

× 0·43
× 1·3
A B
× 0·35
HERB MUSEI BRITANNICI
R. Brown, Iter Australie
Nr 2346

FIG. 22. *Plectranthus forsteri* (Greenwood 100).
See also Fig 17D.

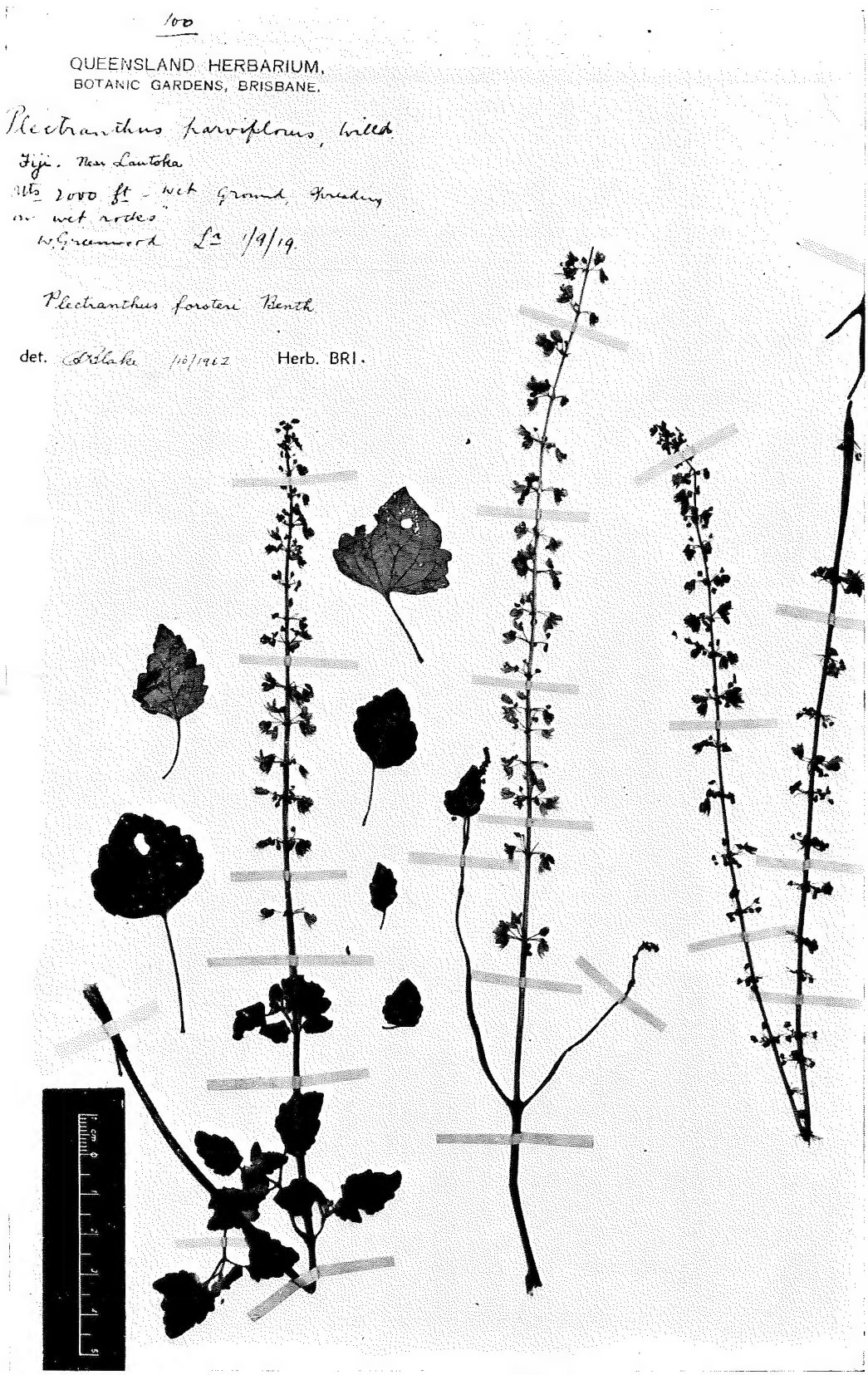

100
QUEENSLAND HERBARIUM,
BOTANIC GARDENS, BRISBANE.
Plectranthus parviflorus, Willd.
Fiji. Nan Lautoka
Alt. 2000 ft - Wet Ground, Growing
in wet rocks
W. Greenwood Ls. 1/9/19.
Plectranthus forsteri Benth.
det. S Blake 10/1942 Herb. BRI.

FIG. 23. *Plectranthus apreptus* (Blake 22045).

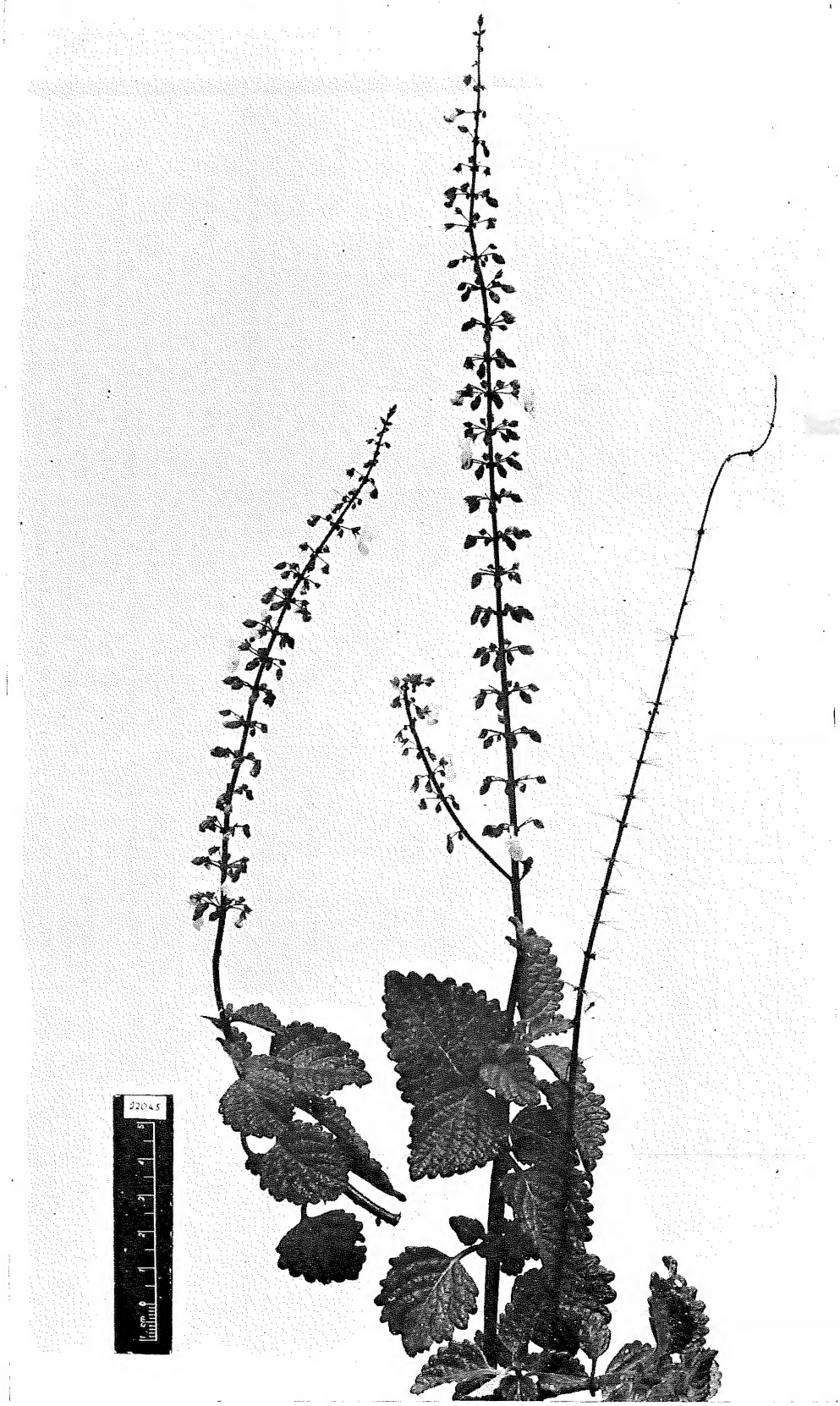


FIG. 24. *Plectranthus gratus* (from same plant as Blake 21192).


2 cm
2mm
RS

FIG. 25. *Plectranthus spectabilis* (from same plant as Blake 20535).

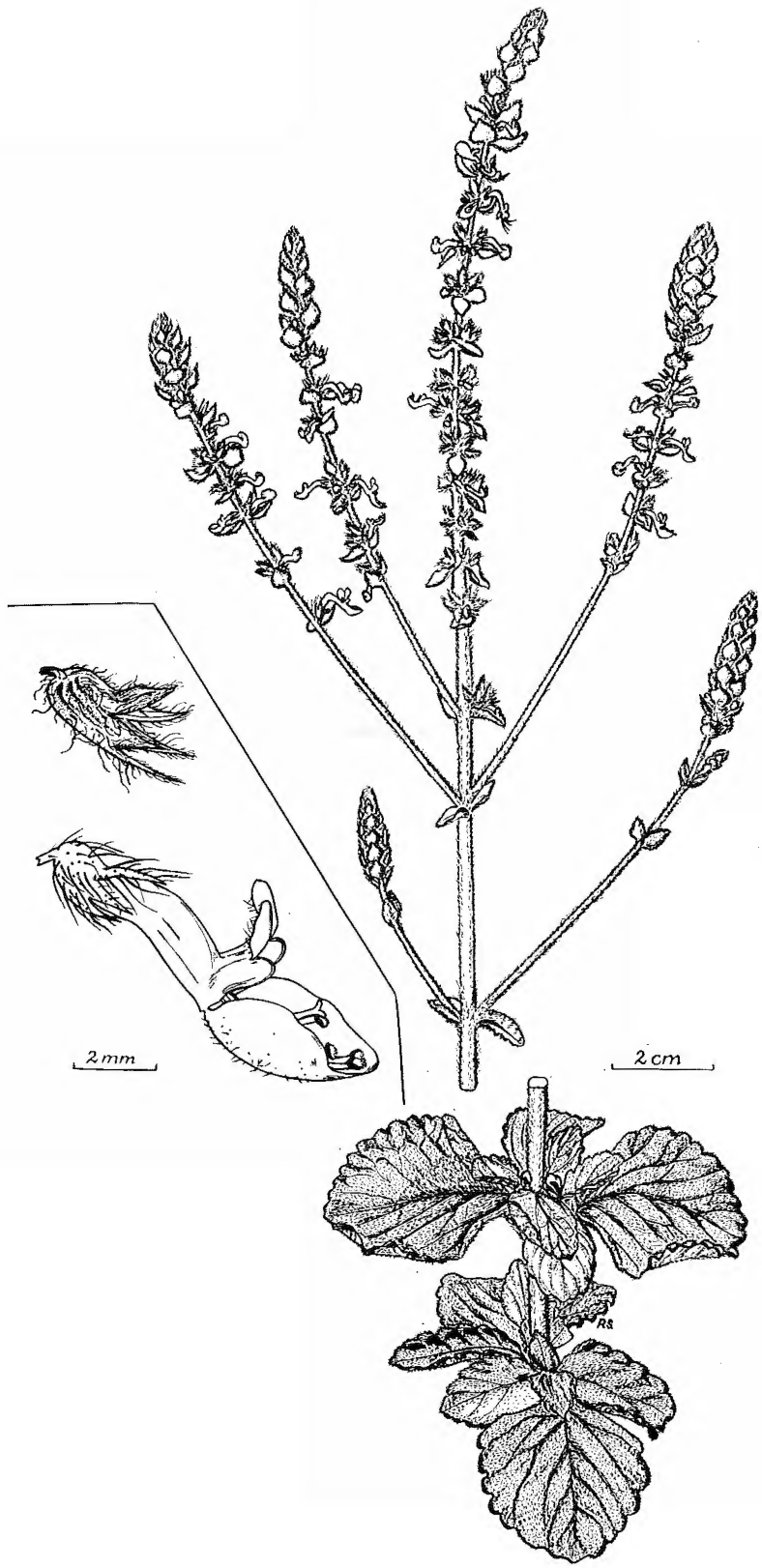

2 mm
2 cm

FIG. 26. *Plectranthus congestus* (Blake 22035).

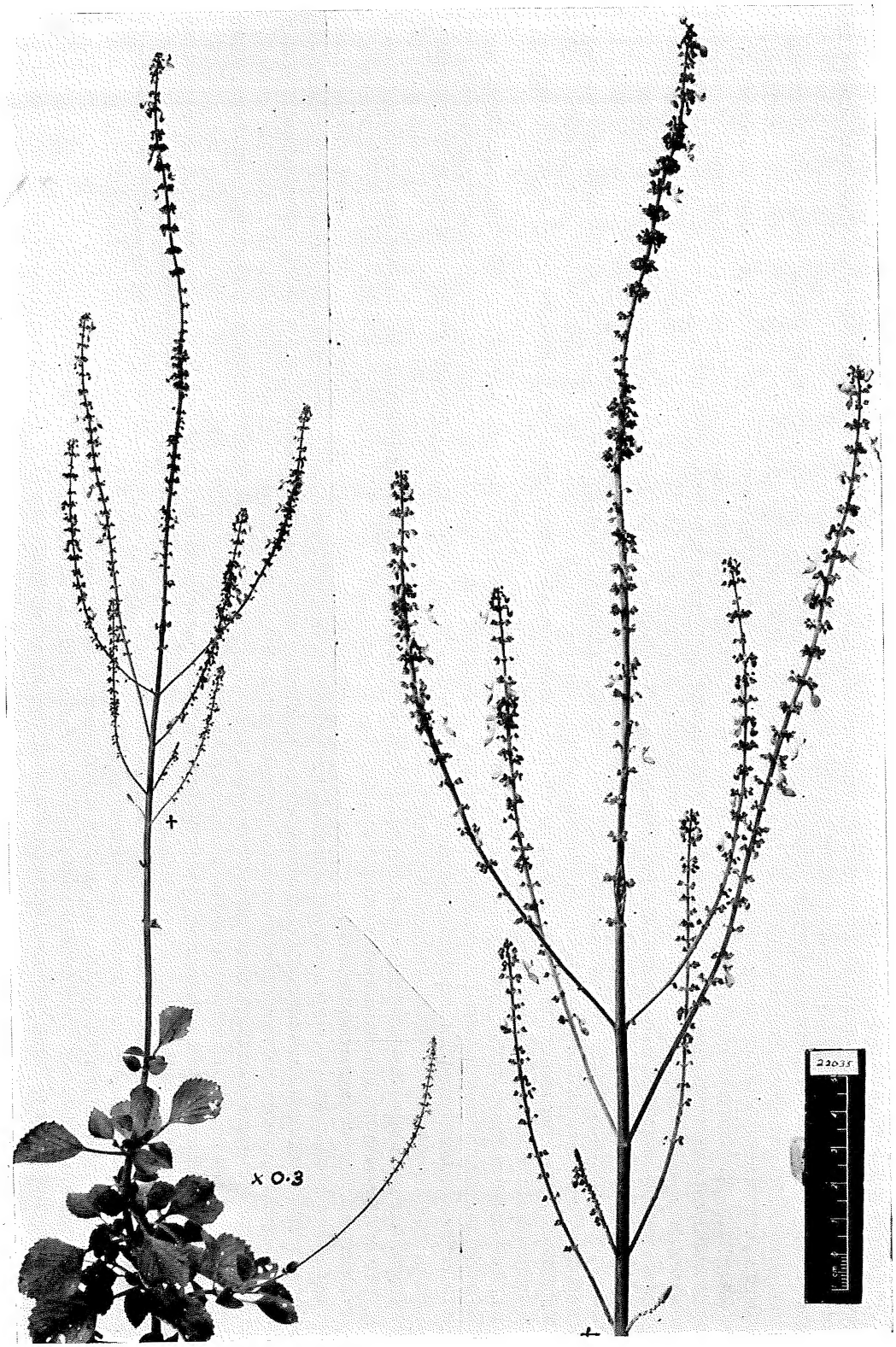

x 0·3
23035

FIG. 27. *Plectranthus petraeus* (van Steenis 12008 (L)).

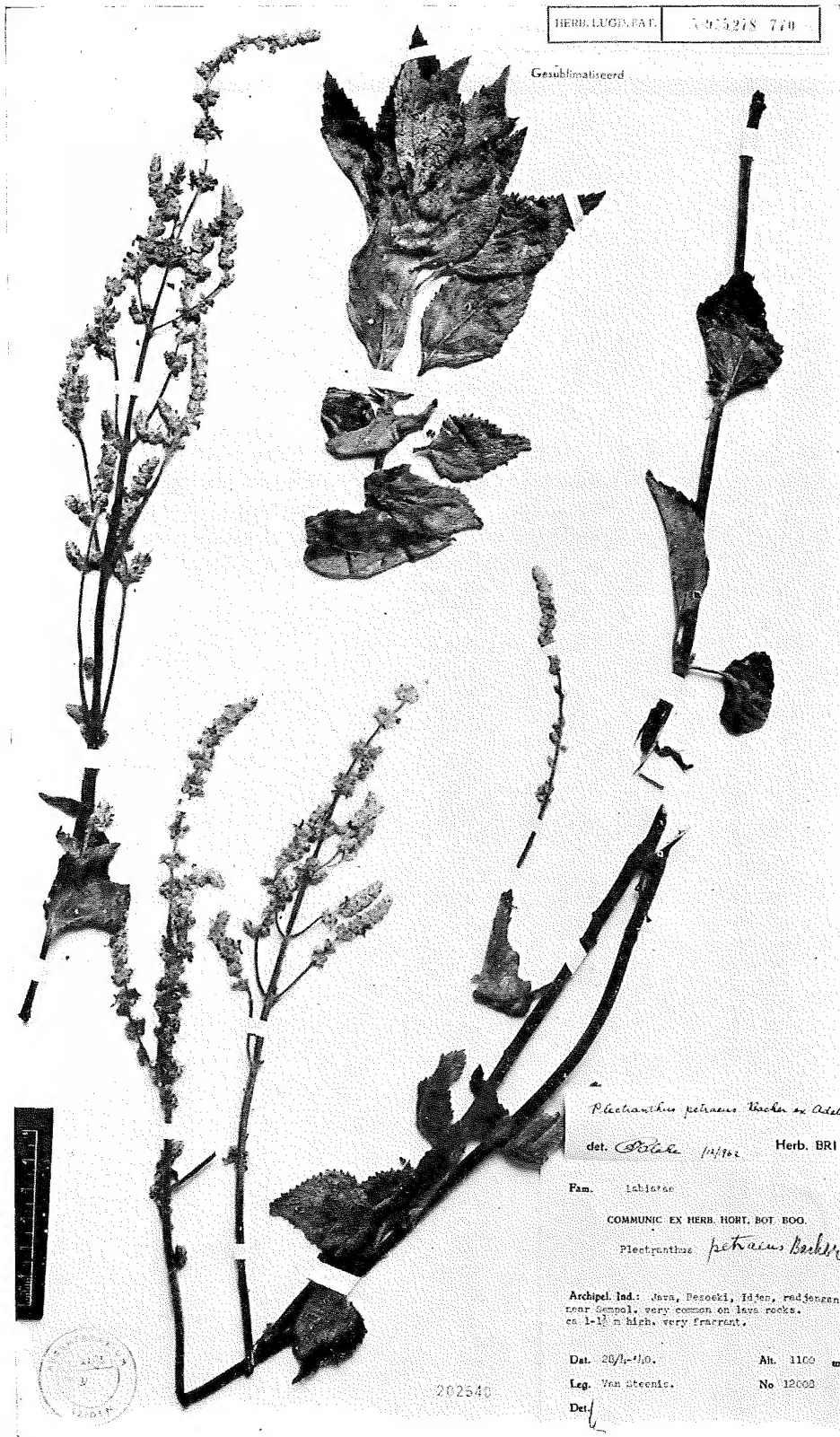

HERB. LUGD. BAT. 905278 770
Gesublimatiseerd
Plectranthus petraeus Becker ex Adelb.
det. Backer 12/1962
Herb. BRI
Fam. Labiatae
COMMUNIC EX HERB. HORT. BOT. BOG.
Plectranthus petraeus Becker
Archipel. Ind.: Java, Pesoeki, Idjen, redjensens near Sempol, very common on lava rocks, ca 1-1½ m high, very fragrant.
Dat. 20/1-'10. Alt. 1100 m.
Leg. Van Steenis. No 12008
Det.
202540

FIG. 28. A, *Plectranthus zeylanicus*, holotype (CGE). B, *P. madagascariensis*, holotype of *Ocimum madagascariense* (P); photographed by the Photographer, Royal Botanic Gardens, Kew, and published by permission of the Director. Bentham's determination on A and part of the labels on B not shown.

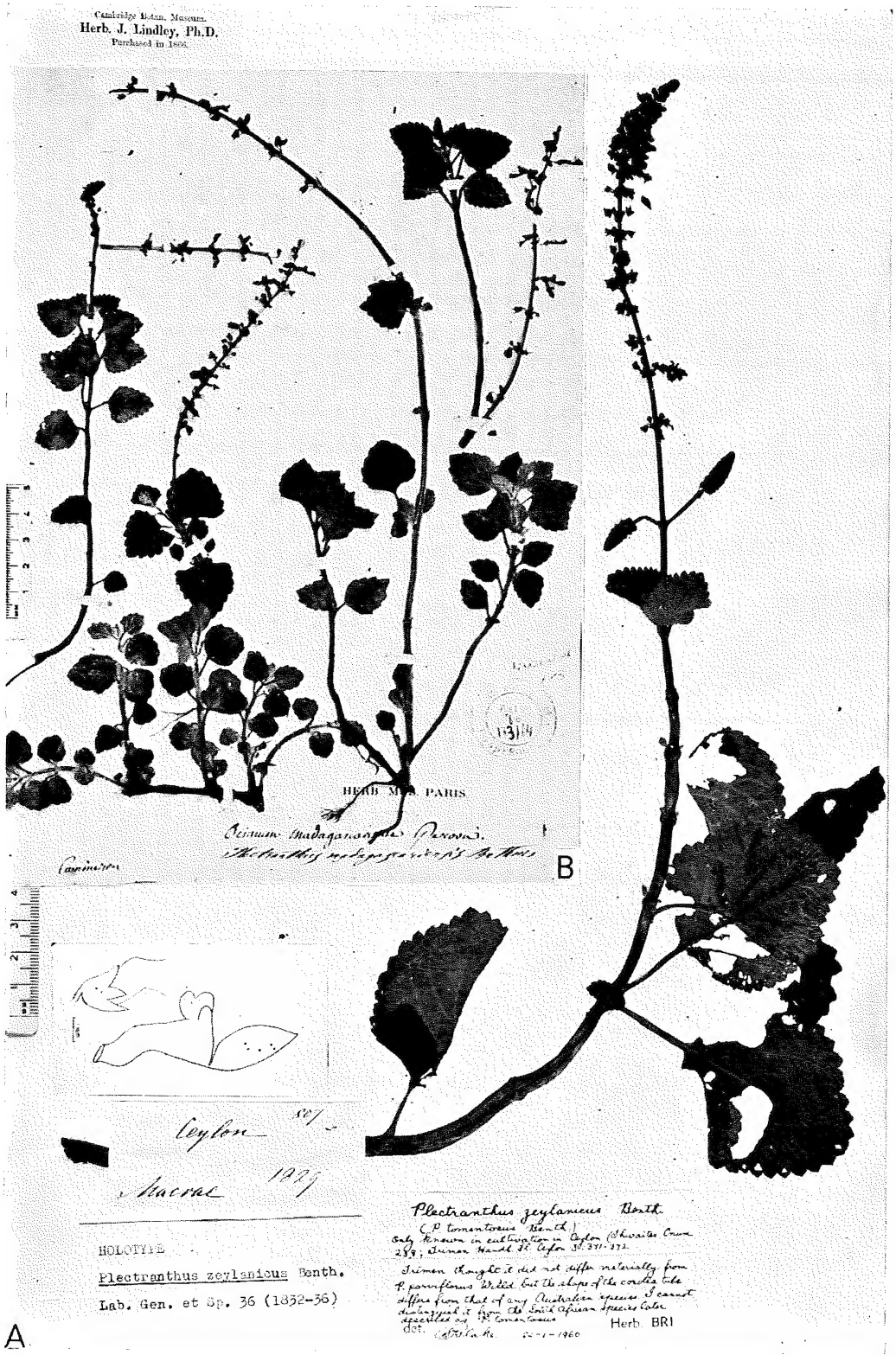
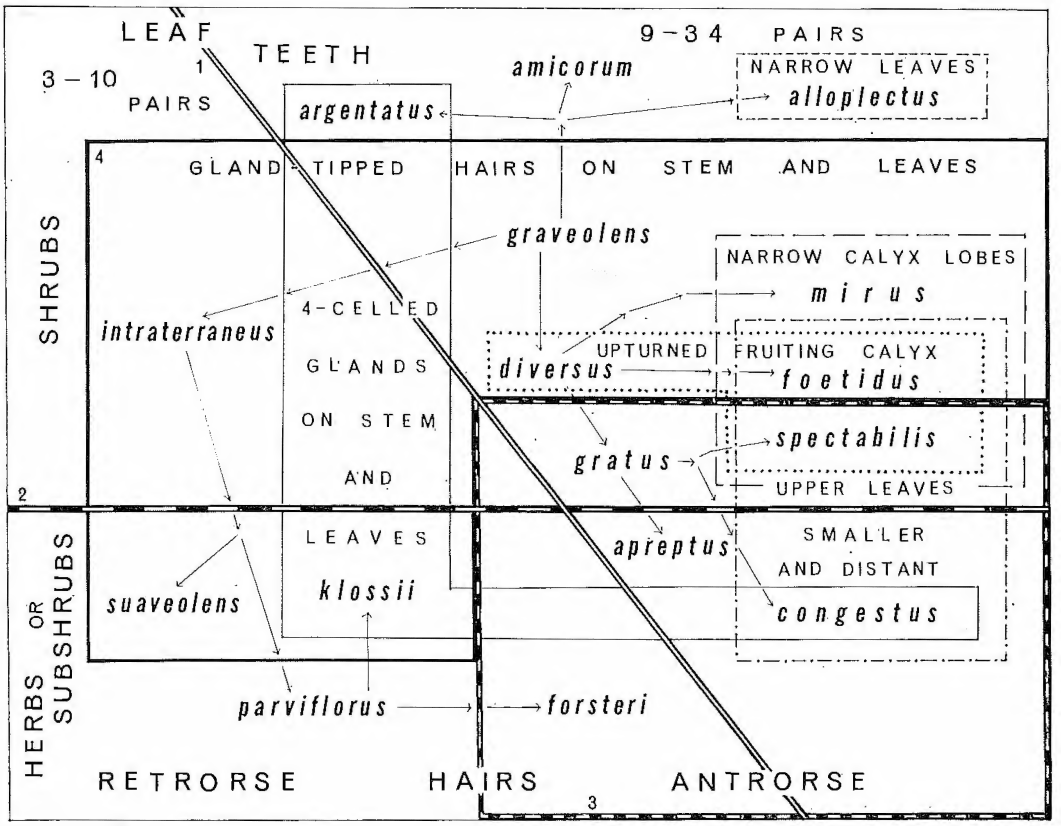

Cambridge Botan. Museum.
Herb. J. Lindley, Ph.D.
Purchased in 1866.
HERB. MUS. PARIS
B
Ceylon
1927
HOLOTYPE
Plectranthus zeylanicus Benth.
Lab. Gen. et Sp. 36 (1832-36)
Plectranthus zeylanicus Benth.
(P. tomentosus Benth.)
Only known in cultivation in Ceylon (Thwaites Enum. 233; Trimen Handb. Fl. Ceylon 3: 371-372.
Herb. BRI
A

FIG. 29. Diagram showing how some characters are shared between the species (*P. petraeus* omitted). The oblique double line (1) separates species having leaves with 3–10 pairs of teeth (at left) from those with 9–34 pairs. The horizontal double line enclosing long black and white spaces (2) separates shrubby species (above) from non-shrubby species. The double line enclosing short black and white spaces (3) encloses species with antrorse hairs on stem and leaves. The solid heavy line (4) encloses species with gland-tipped hairs on stem and leaves. Other lines enclose species with the characters shown. Arrows suggest relationships.

FIG. 30. Distribution map of the genus *Plectranthus*.


LEAF TEETH
3 – 10 PAIRS
1
9 – 34 PAIRS
amicorum
NARROW LEAVES
alloplectus
argentatus
4
GLAND-TIPPED HAIRS ON STEM AND LEAVES
graveolens
NARROW CALYX LOBES
mirus
SHRUBS
4-CELLED GLANDS ON STEM AND LEAVES
intraterraneus
UPTURNED
diversus
FRUITING CALYX
foetidus
spectabilis
gratus
UPPER LEAVES
2
apreptus
SMALLER AND DISTANT
congestus
suaveolens
klossii
HERBS OR SUBSHRUBS
parviflorus
forsteri
RETROSE HAIRS ANTRORSE
3

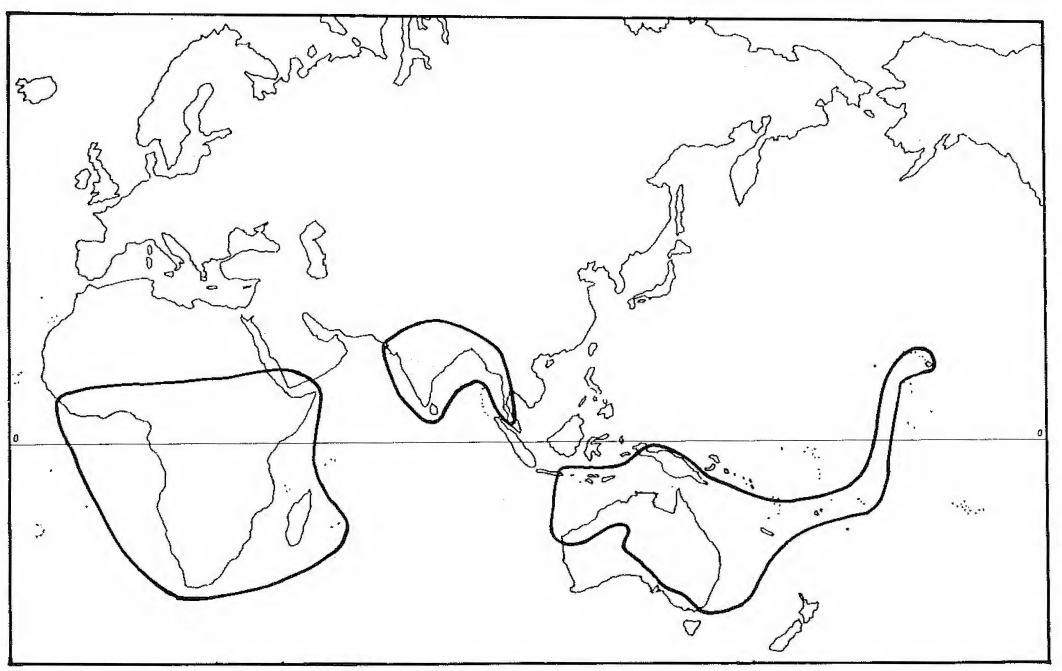
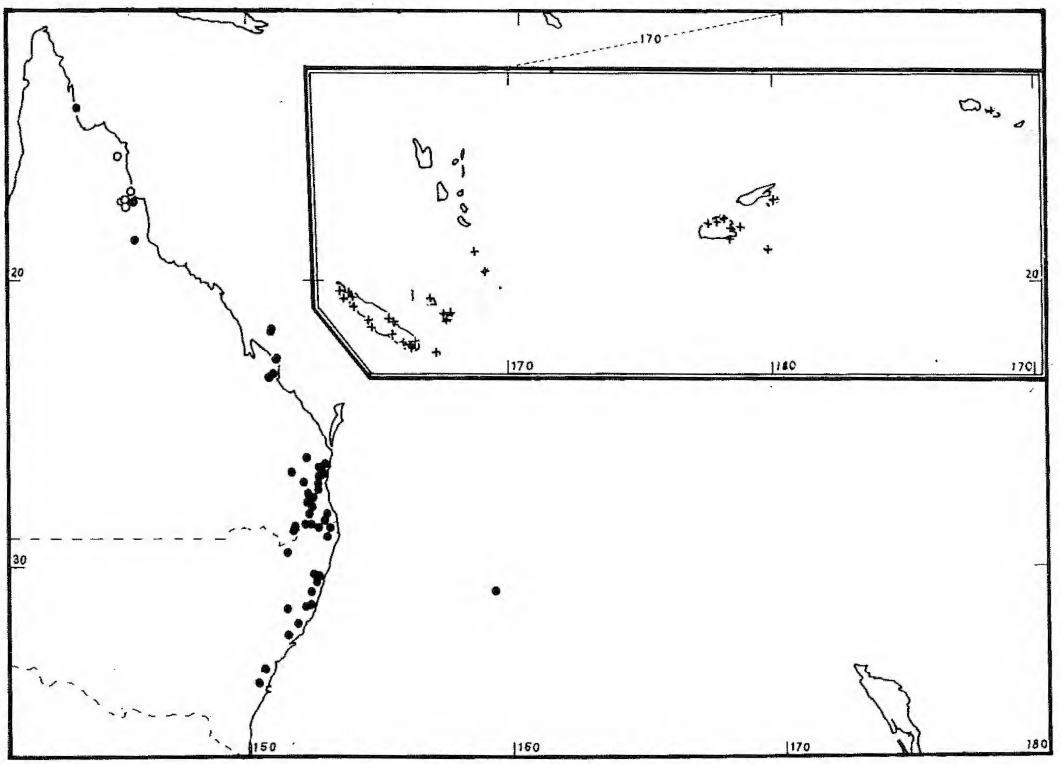

0
0

FIG. 31. Distribution of *Plectranthus graveolens* (•), *P. mirus* (o), and *P. forsteri* (+).

FIG. 32. Distribution of *Plectranthus alloplectus* (•), *P. diversus* (o), and *P. gratus* (+).

FIG. 33. Distribution of *Plectranthus argentatus* (•), *P. foetidus* (o), and *P. amicorum* (+).

FIG. 34. Distribution of *Plectranthus suaveolens* (•), and *P. spectabilis* (o).



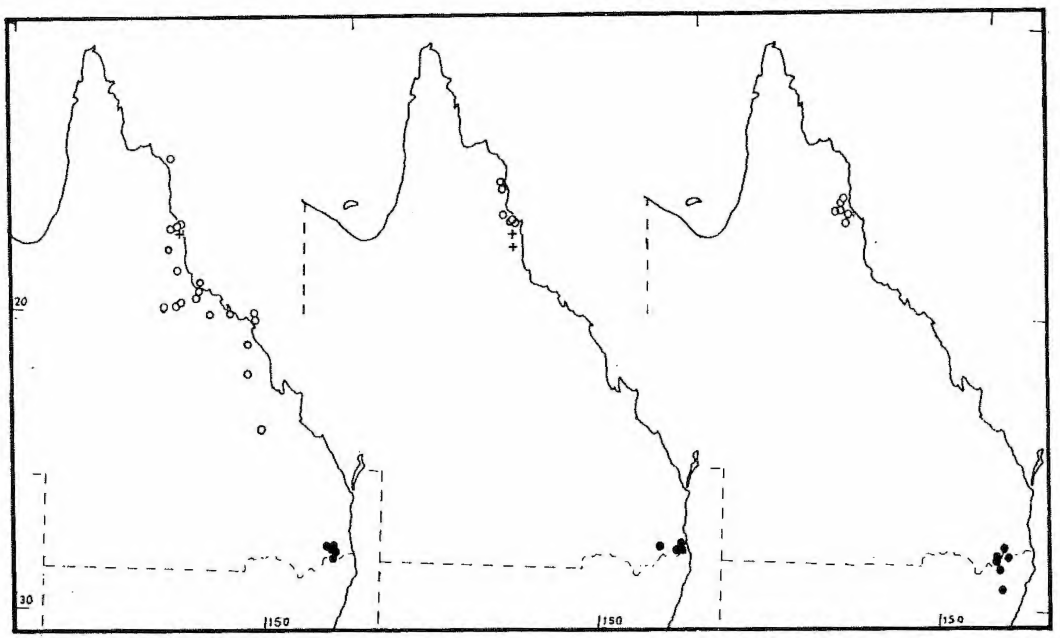
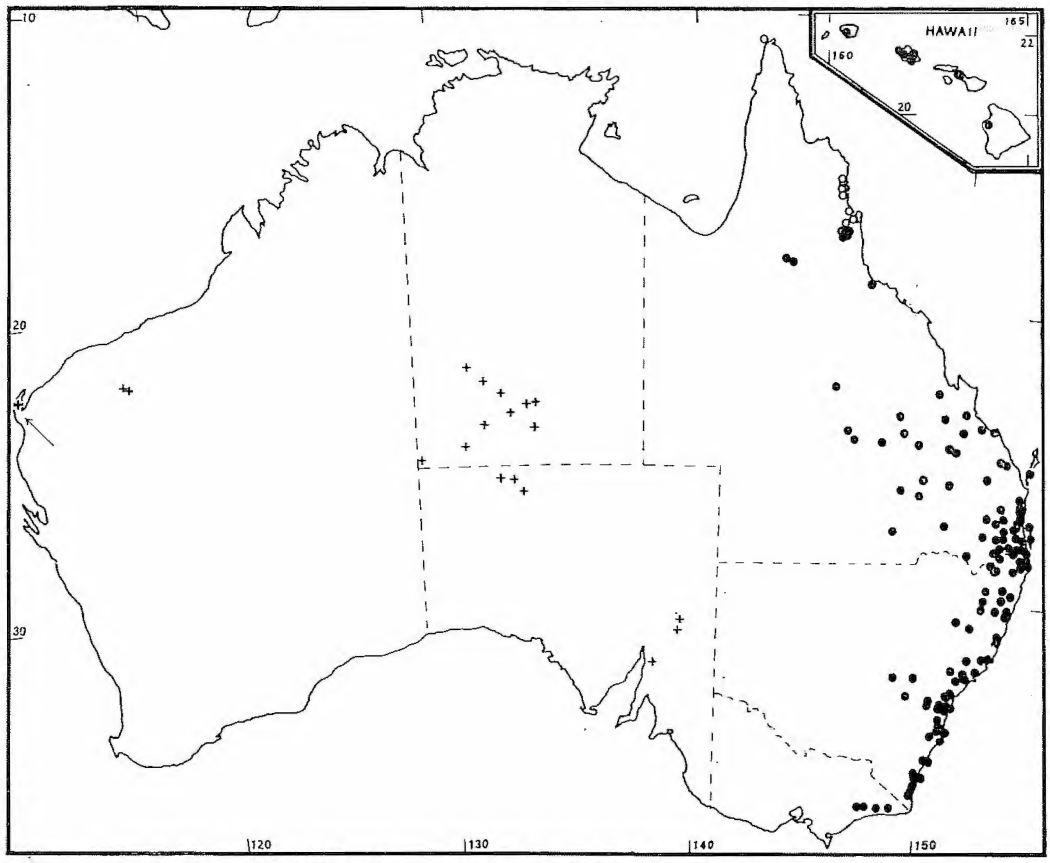
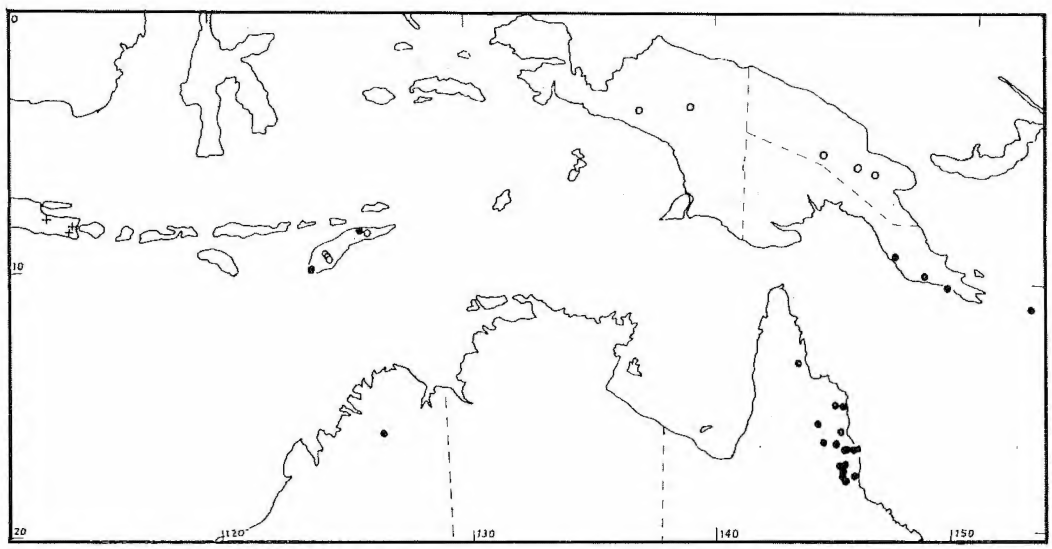


FIG. 32 FIG. 33 FIG. 34

FIG. 35. Distribution of *Plectranthus parviflorus* (●), *P. apreptus* (o), and *P. intraterraneus* (+). Part of Hawaiian Islands in inset.

FIG. 36. Distribution of *Plectranthus congestus* (●), *P. klossii* (o), and *P. petraeus* (+).


HAWAII
165
22
160
20
10
20
30
120
130
140
150


0
10
20
120
130
140
150

INDEX TO BOTANICAL NAMES

Names of subgenera, sections, etc., of *Plectranthus* appear on pp. 4, 5 and 7.

Names of genera and species accepted as correct are in roman type; other names are in italics.

Page numbers in roman type refer to descriptions and subsequent discussions, formal listing of synonyms and (in parentheses) figures.